DATA ENTRY PROCEDURES
FOR
ECOSYSTEM DESCRIPTION FORMS:
WILDLIFE

B.A. Pendergast
R.A. Hunter
D.A. Demarchi

Ministry of Environment
Terrestrial Studies Branch
Wildlife Unit

Victoria, B.C.

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INTRODUCTION

The wildlife data form provides methods for site specific evaluation of wildlife habitat and populations. It is not intended that the entire form be filled out by all investigators. Instead specific portions of the form should be utilized according to the objectives of the study and expertise of the field investigator. The form was developed to accommodate data relating to several programs including:

1) Coastal waterbird census as conducted by the Terrestrial Studies Branch, Fish and Wildlife Branch and Canadian Wildlife Service staffs.

2) Wildlife Capability Classification for British Columbia: An Ecological (Biophysical) Approach for Ungulates; and

3) Ministry of Forests and Ministry of Environment ecological or biophysical surveys in which wildlife data are collected to complement soil and vegetation data.

It should be noted that some information relevant to site specific wildlife use (e.g. browsing assessment and grazing level ratings) are incorporated in the Vegetation Description Form.

DESCRIPTIONS OF TERMINOLOGY AND DATA CODING PROCEDURES

SITE FORM

A Site Description Form must be completed to accompany each Wildlife Form. Site data items 1, 2, 3, 4, 5 or 6, 7, 8, 9, 10, 11, 18, 50, and 51 must be filled out in every case and where applicable data items 19, 20, 21, 22, 25, 26, 27, 34, and 39 should accompany each Wildlife Form. Instructions for recording "Site Description" data are provided in Data Entry Procedures for Ecosystem Description Forms, Sondheim et al., 1982.

Because the current Site Description Form was designed with a soils/vegetation bias it does not accomodate some of the general information normally recorded by wildlife biologists conducting field surveys. For example space has not been provided for recording factors such as time, weather, and other environmental conditions which may influence animal distribution and abundance (see Figure 1).

In order to record this information in a computer compatible format a portion of the "Plot Representing" section (18) of the Site Description Form has been structured to accomodate general information pertaining to wildlife surveys. Codes and data recording instructions are provided below.

TIME START (TS) columns 85-88

Time of day that observation period began

TIME FINISHED (TF) columns 92-95

Time of day that observation period finished

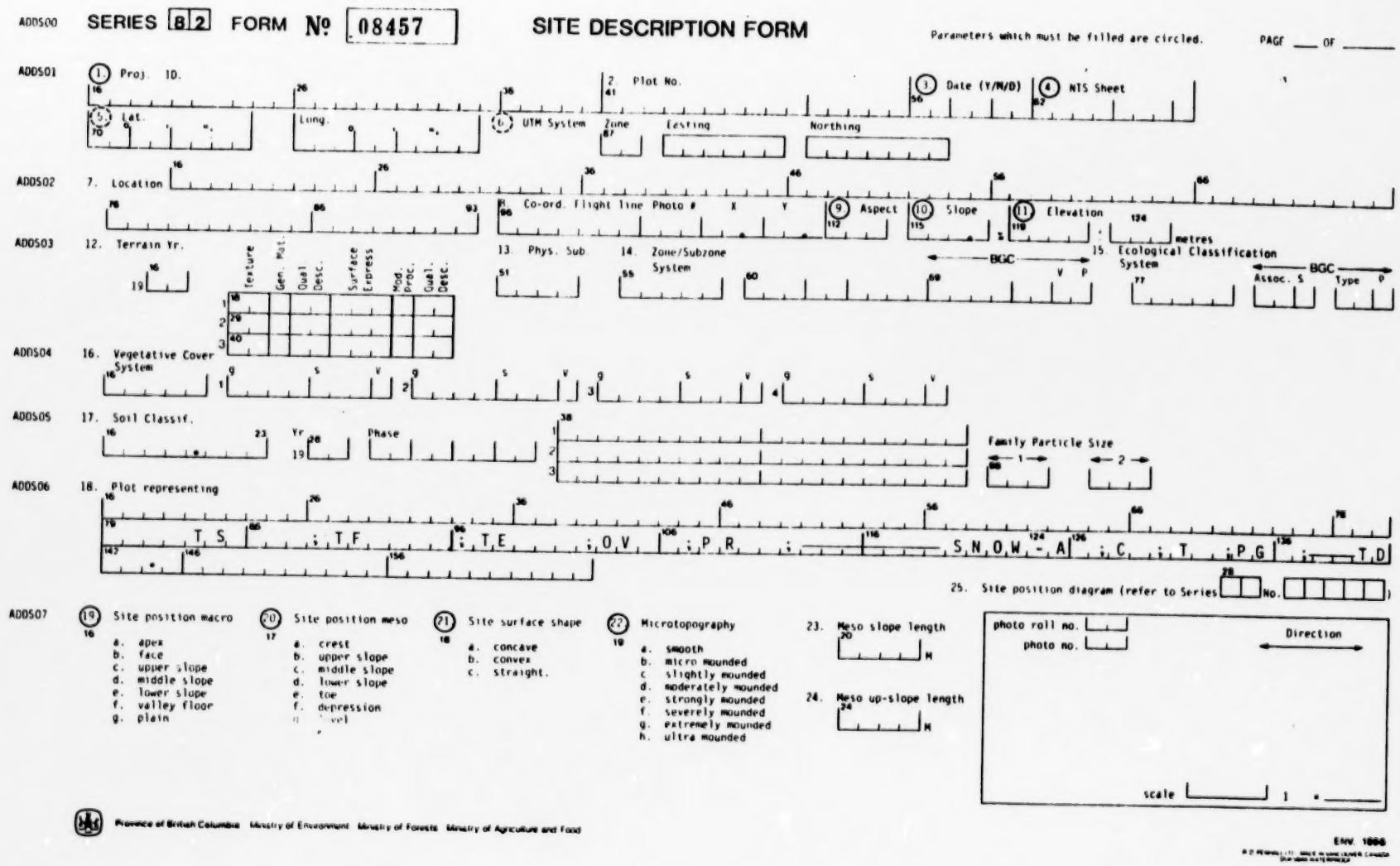
TEMPERATURE (TE) columns 99-101

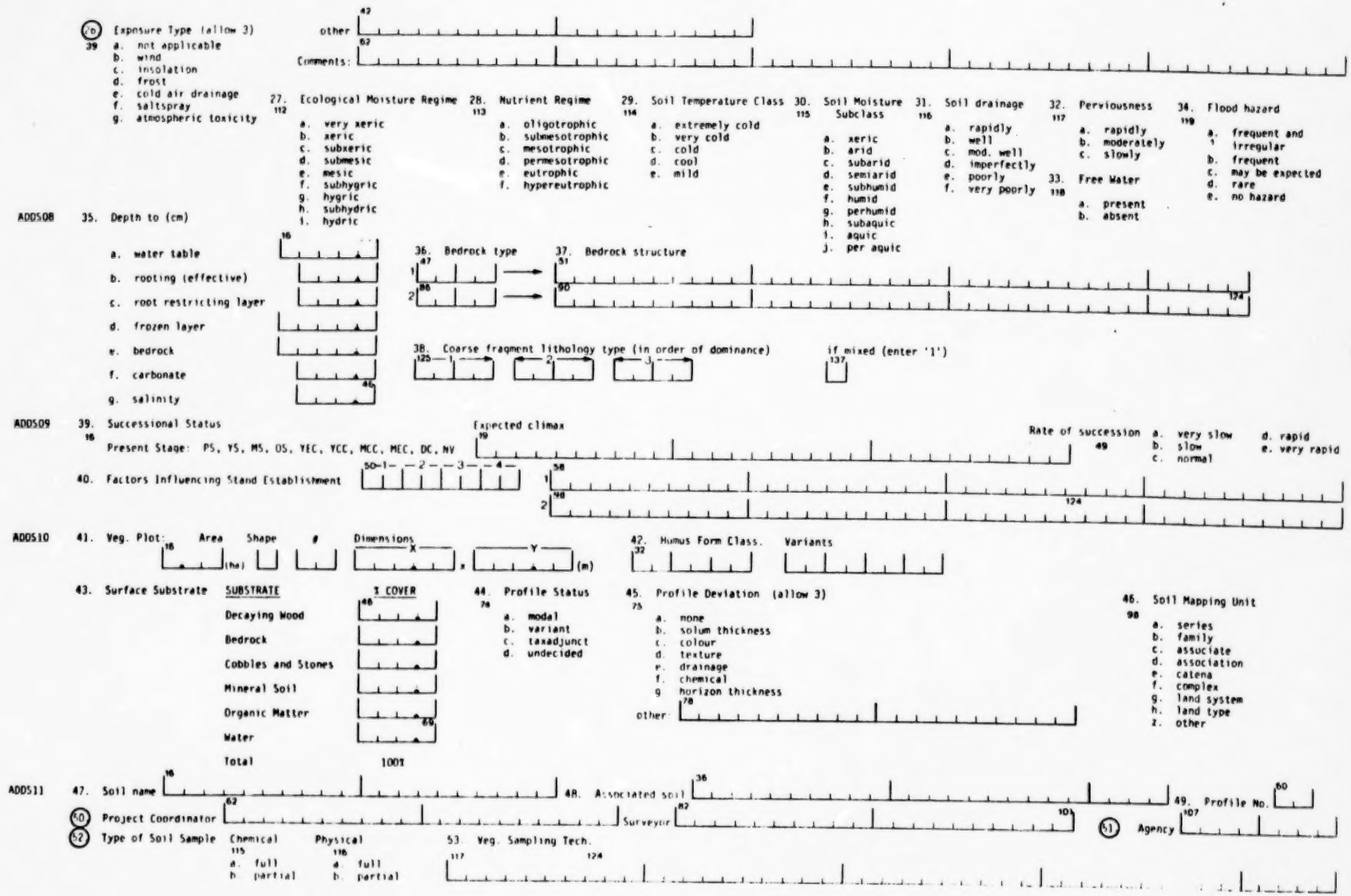
Air temperature at time of survey (°C). Minus temperatures should be preceded by a minus sign.

OVERCAST (OV) columns 105-106

Percent overcast, an entry of 99 will be interpreted as 100%

Figure 1 Site Description Form




(70) Exposure Type (allow 3)
39
a. not applicable
b. wind
c. insolation
d. frost
e. cold air drainage
f. saltspray
g. atmospheric toxicity
other
Comments:
27. Ecological Moisture Regime
a. very xeric
b. xeric
c. subxeric
d. submesic
e. mesic
f. subhygric
g. hygric
h. subhydric
i. hydric
28. Nutrient Regime
a. oligotrophic
b. submesotrophic
c. mesotrophic
d. permesotrophic
e. eutrophic
f. hypereutrophic
29. Soil Temperature Class
a. extremely cold
b. very cold
c. cold
d. cool
e. mild
30. Soil Moisture Subclass
a. xeric
b. arid
c. subarid
d. semiarid
e. subhumid
f. humid
g. perhumid
h. subaquic
i. aquic
j. per aquic
31. Soil drainage
a. rapidly
b. well
c. mod. well
d. imperfectly
e. poorly
f. very poorly
32. Perviousness
a. rapidly
b. moderately
c. slowly
33. Free Water
a. present
b. absent
34. Flood hazard
a. frequent and irregular
b. frequent
c. may be expected
d. rare
e. no hazard
ADDS08
35. Depth to (cm)
a. water table
b. rooting (effective)
c. root restricting layer
d. frozen layer
e. bedrock
f. carbonate
g. salinity
36. Bedrock type
37. Bedrock structure
38. Coarse fragment lithology type (in order of dominance)
if mixed (enter '1')
ADDS09
39. Successional Status
Present Stage: PS, YS, MS, OS, YEC, YCC, MCC, MEC, DC, NV
Expected climax
Rate of succession
a. very slow
b. slow
c. normal
d. rapid
e. very rapid
40. Factors Influencing Stand Establishment
ADDS10
41. Veg. Plot: Area (ha) Shape # Dimensions X x Y (m)
42. Humus Form Class.
Variants
43. Surface Substrate
SUBSTRATE
% COVER
Decaying Wood
Bedrock
Cobbles and Stones
Mineral Soil
Organic Matter
Water
Total
100%
44. Profile Status
a. modal
b. variant
c. taxadjunct
d. undecided
45. Profile Deviation (allow 3)
a. none
b. solum thickness
c. colour
d. texture
e. drainage
f. chemical
g. horizon thickness
other
46. Soil Mapping Unit
a. series
b. family
c. associate
d. association
e. catena
f. complex
g. land system
h. land type
z. other
ADDS11
47. Soil name
48. Associated soil
49. Profile No.
(80) Project Coordinator
Surveyor
(81) Agency
(82) Type of Soil Sample
Chemical
a. full
b. partial
Physical
a. full
b. partial
53. Veg. Sampling Tech.

PRECIPITATION (PR) columns 110-111

Type of precipitation should precede intensity. Codes for these are listed below:

TYPE	R - rain	INTENSITY	L - Light
	S - snow		M - Moderate
	X - sleet		H - Heavy
	H - hail		

SNOW AMOUNT (SNOW-A) column 126

0 - nil
1 - partial or intermittent
2 - 1-25 cm
3 - 25-50 cm
4 - 50-75 cm
5 - 75-100 cm
6 - 100-125 cm
7 - >125 cm

SNOW CONDITIONS (SNOW-C) column 129

1 - soft, fluffy and dry
2 - soft and wet
3 - soft, wet and dense
4 - subsurface crust
5 - surface crust

TIME SINCE LAST SNOW: (SNOW-T) column 132

1 - fresh snow - within last 12 hours
2 - recent snow - within last 48 hours
3 - old snow - snow within past 2 weeks
4 - stagnant snow - no new snow within past 2 weeks

PLANT GROWTH STAGE (PG) column 136

1. winter dormancy - no deciduous plant growth
2. spring green-up - deciduous plant growth beginning
3. summer growth - plant growth active and complete
4. autumn senility - plant growth declining - leaves falling

TIDE (TD) columns 142-145

Tide stage (+) flooding, (-) falling, or (0) slack should be entered along with average tide height in metres at time of observation.

WILDLIFE FORM (Appendix 2)

Terminology for data elements for which information may be recorded on the Wildlife Data Form is presented below. For the sake of convenience data elements are described in the order that they occur on the computer compatible form.

SERIES AND FORM

Series and form numbers should be identical to those of the corresponding Site Form.

PROJECT ID

Project identification code - this must be identical for all forms of a given project. It is recommended that it not exceed six characters.

PLOT NO.

Plot number - the way in which this item is entered is left to the discretion of the project coordinator. In some projects it may be useful to

assign the first character the value 1, 2, or 3 indicating whether the form represents a quick, intermediate or detailed examination.

SURVEYOR

The name of the individual completing the form. Where more than one individual is involved, dashes should be used between the names.

COMMON NAME

A space is provided for entry of common names of species observed. Although this information will not be entered into the computer it is suggested that it be recorded in the field.

COUNT

SPECIES CODE columns 16-19

Four letter codes for all species of birds, mammals, reptiles and amphibians known to occur in British Columbia are presented in Appendix 1. Codes represent abbreviations of the common names of animal species, for example MOOSE is coded MOOS and DUNLIN is DUNL. Where the common name is composed of two words the first two letters of each word are combined e.g. GRIZZLY BEAR is coded GRBE and AMERICAN ROBIN is AMRO. Common names composed of more than two words utilize one letter from each of the first words and one or two from the last depending on whether the common name consists of 3 or 4 words e.g. RED-BACKED VOLE is coded RBVO and Black-Crowned Night Heron is coded BCNH. Exceptions to these conventions occur in cases where duplication of codes is encountered. Investigators should therefore consult the Appendix until familiar with the codes.

SEX column 20

Codes for sex are:
F - Female and

M - Male

U - should be used to represent situations where sex is unknown or considered unimportant to record

AGE column 21

Codes for age are:

J - Juvenile - an individual too young to breed and still distinguishable from breeding adults by external characteristics

S - Subadult - an individual which has not bred but which externally resembles an adult

A - Adult - an individual which has bred or is capable of breeding

NUMBER columns 22-25

The number of individuals of a species up to 9999 may be recorded in the four spaces provided. If a group of a species at a given location is comprised of individuals of different sex and/or is utilizing a different habitat type the investigator may wish to separate them by recording them on separate lines on the data form.

CODE column 26

Codes to indicate the type of census are provided below

C - complete count

I - incomplete count (not all individuals at the site included within census)

E - estimate

ACTIVITIES

Fifteen animal activities are described below. In filling out the data form investigators should record the % of animals included in the count taking part in each activity according to the codes below.

0	0%
1	0 < 5%
2	5 - 25%
3	25 - 50%
4	50 - 75%
5	75 - 95%
6	> 95%

e.g. if between 25 and 50% of animals observed are feeding enter 3 under feeding.

FEEDING column 27

Includes behaviour directed toward obtaining and consuming food items.

COURTSHIP column 28

Copulation and behaviour oriented toward enticing another individual into copulation. Examples of such behaviour include territorial displays, courtship feeding, and aggressive behaviour exhibited by conspecifics during the mating season.

REARING/INCUBATION column 29

Behaviour oriented toward caring for young and/or eggs and including bearing of young.

SLEEPING/BEDDING column 30

Differs from loafing in that the animal takes the sleeping position and/or retires to a location normally utilized for sleeping such as a lair, den, bed or roost.

LOAFING column 31

Behaviour which appears to be lazy or idle in nature. Includes such behaviours as sunning and standing.

PREENING column 32

Behaviours oriented toward grooming, trimming, or dressing of fur or feathers with the tongue or beak and including behaviours such as rubbing of velvet and scratching.

BATHING column 33

Behaviours involving immersion of the body in water but not for swimming or feeding. Also includes dirt and mud baths.

INSECT AVOIDANCE column 34

Behaviour oriented toward avoidance of insects such as standing on snow fields by caribou in summer when insects are abundant.

ALERT column 35

Behaviour directed toward detection of predators e.g. guard on sentry duty.

COMMUTING column 36

Regular daily trips, e.g. daily flights to and from a roosting site.

MIGRATION column 37

Regular (annual) trips, e.g. bird, whale or sea lion migration.

Several activities applying to non-commuting or non-migratory oriented movements are described below.

FLYING column 38

Includes flying, gliding, hovering, soaring, etc.

RUNNING/WALKING column 39

Includes walking, running, cantering, hopping, galloping, etc. Also includes slithering.

SWIMMING column 40

Includes all forms of locomotion in or through a body of water.

UNCLASSIFIED column 41

This category may be used when behavioural information cannot be recorded because time does not permit or behaviour is too ambiguous or diversified to categorize. Animals identified by non-territorial vocalizations such as growls or howls may also be included in this category.

SIGN

Sign represents indirect evidence of an animal's presence or use of habitat. The number of items (e.g. antlers) comprising the sign should be entered followed by the appropriate code. Space is provided to enter two types of sign should this occur. These should be entered in descending order of importance. Columns 43-45 more important; columns 46-48 less important.

A - Artifacts: Artifacts include incidental portions of animal's bodies which are left behind such as feathers, hair and shed skins. Also

included in this category are carcasses or portions of carcasses. Shed antlers are included in a separate category.

S - Shed Antlers: A solid annually deciduous horn of a Cervidae (member of the deer family).

H - Homesites: Homesites include nests, beds, dens or lodges.

M - Territorial Marking: A marking used by an animal to indicate home range or breeding territory. Examples include elk wallows, beaver scent piles, and bear scratches on trees.

G - Sign General: Non-territorial markings including dustbowls and antler rubbings on trees.

E - Excrement: Includes:

feces (droppings, scats and pellet groups) - bodily wastes discharged through the anus;

castings (regurgitated pellets) - bodily wastes discharged through the mouth, primarily by birds and snakes;

urine - bodily wastes secreted by the kidneys; either clear, amber fluids by mammals semisolid by birds and reptiles.

T - Tracks: Footprints (either singular or a path made by repeated footfalls) or body markings on the ground.

F - Feeding Sign: includes:

Indirect evidence such as cratering in snow or cavities in trees or direct evidence such as chew marks on plants, sapholes in trees and animal carcasses.

UNGULATE columns 50-55

Pellet groups can indicate ungulate species and provide a measure of abundance complementary to browse utilization data. There are a number of

methods for establishing pellet group plots. Since the method used depends on conditions of the sample area, local biologists should be contacted for assistance in selecting the most apropriate method.

Four methods for conducting pellet group counts coded 1, 2, 3 and 4 are described below.

Averages of pellet group counts should be entered under winter and/or summer as appropriate. The appropriate code for Method (column 54) should also be entered. Counts on which averages are based may be entered as a comment if so desired.

1. Method 1

This method is suggested for areas where shrub cover does not impede the accuracy of pellet group counts (e.g. Interior Douglas-fir).

In the centre of the survey plot, away from the soil pit, choose a tree or some other object as a centre for a circular pellet group subplot of radius 4.7 m; the area of this subplot is .007 ha. Four additional subplots are established 20 m from the centre of the first subplot in each of the cardinal directions (N, S, E, and W); or, if on a moderate to steep slope, the subplots can be located 20 m up-slope and down-slope, and to each side of the centre subplot. See Figure 2 for illustration of subplot layout.

Be sure that subplots outside of vegetation study plot area occur within the same kind of habitat. It is essential that the subplots reflect habitat conditions described in the Site, Soil and Vegetation Forms.

2. Method 2

This method is suggested for areas where shrub cover is so abundant as to physically impede accurate pellet counts using Method 1 (e.g. Coastal cedar - hemlock).

If the plot corners are flagged and measure about 20 m x 20 m, pick diagonal corners as centers for the start of two sets of five pellet group subplots (Figure 3). If the plot is smaller than 20 m x 20 m or is unflagged, pick two points approximately 30 m apart within the sample site, as the start of the subplots. One diagonal corner flag or marked point is used as the centre for a circular pellet group subplot of radius 2 m; the subplot area is 0.001256 ha.

The centre of each additional subplot is approximately 10 m from the centre of the first subplot in each of the four cardinal (N, S, E, and W) directions; or, if on a moderate to steep slope the subplots can be located up-slope, down-slope, and to each side of the centre subplot. A second cluster of five subplots is established in the same fashion at the second marked subplot. Ensure that all subplots remain within the habitat type being sampled.

3. Method 3

This method is suggested for areas where shrub cover is so abundant as to physically impede accurate pellet group counts using Method 2 (e.g. thick brushy sites).

If the plot corners are flagged, pick the four corners as centres for the start of four sets of five pellet group subpots (Figure 4). If the plot is unflagged, pick two points approximately 30 m apart within the sample site, and then another two points 30 m apart, as the centre of the subplots. Each subplot radius is 1 m; the area of each subplot is 3.14 m^2 or 0.000314 ha.

The centre of each additional subplot is approximately 5 m from the centre of the 'starter' subplot in each of the four cardinal (N, S, E, and W) directions; or, if on a moderate to steep slope, the subplots can be located up-slope, down-slope, and to each side of the centre subplot. Each additional cluster of five subplots is established in the same fashion. Ensure that all subplots remain within the habitat type being sampled.

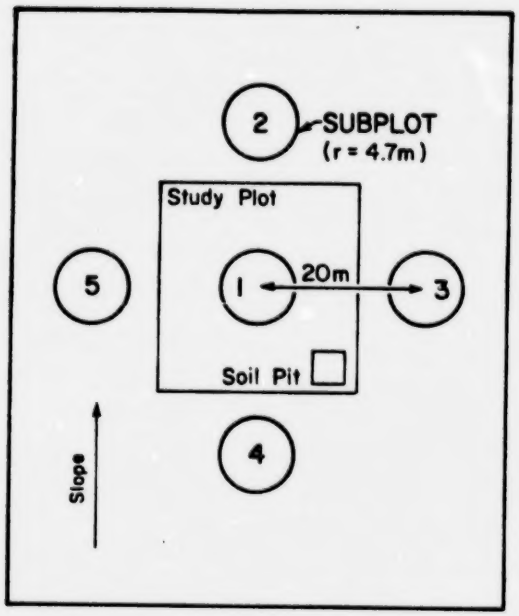


FIGURE 2 Subplot Layout for Ungulate Pellet Group Count; Method 1

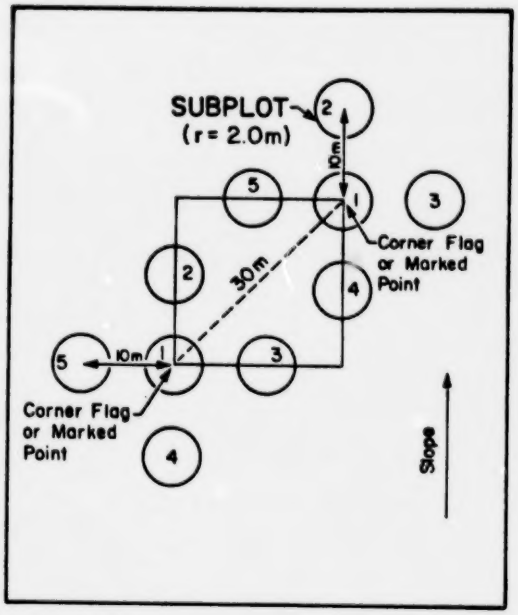


FIGURE 3 Subplot Layout for Ungulate Pellet Group Count; Method 2

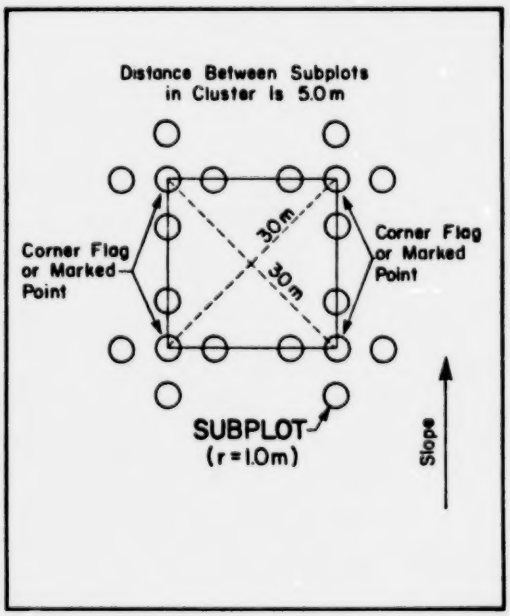


FIGURE 3 Subplot Layout for Ungulate Pellet Group Count; Method 3

4. Method 4

A simpler method of conducting pellet group counts than those described above involves a line transect method. To accomplish this a one metre wide belt 50 m long may be established and divided into 5 equal (10 m) segments. Pellet counts may be conducted within each of these and an average taken. This value equals the number of pellet groups/.0001 ha.

Criteria for Determining Age of Ungulate Pellet Groups

Pellets, like other organic matter, decay and are eventually incorporated into the soil. The route of this breakdown varies greatly with exposure to weather and other such factors such as type of food from which the pellets are derived. For these reasons, the following discussion should be considered only as an approximate guide to aging. Better local guides can be prepared after consultation with local biologists.

Winter Pellet Groups: new pellets defecated during the past winter and after snow melt usually have shiny, smooth surfaces. They break open easily to reveal interiors of rich colour. These pellets usually sit on top of the litter. Old pellets defecated prior to the past winter usually have slightly cracked and duller surfaces. The past winter's snow may have melted through such pellets, cracking their surfaces and pressing them into little pockets in the litter. In a deciduous stand they may be fully or partly covered by leaf litter. The interior may be a duller colour than that of new pellets.

Summer Pellet Groups: pellet groups defecated during the current spring or summer are usually rich in colour, have smooth surfaces and are irregular shaped or compacted due to lushness of the forage consumed. These pellets have been deposited on top of the litter.

Often it is difficult to "age" pellets because of overlap in characteristics due to available diet or to unusually rapid or slow rates of decay.

In these areas, it may not be desirable to attempt to "age" pellet groups in which case the following guidelines should be used. If a unit is a known winter range then the pellet group tally should be entered in the winter column, similarily if the area is a known summer range or is known not to be a winter range then the pellet group tally should be entered in the summer column. If there is no evidence to indicate a winter or summer range then the local biologist should be consulted to help determine the unit's use.

Identification of Ungulate Pellet Groups by Species

The local Wildlife and/or Habitat Biologist should be consulted to find out what ungulate species are in the area, and where they range in winter and summer. A good reference for field identification of pellets is:

Murie, O.J.: "A FIELD GUIDE TO ANIMAL TRACKS". The Peterson Field Guide Series, Second Edition, Houghlin Mifflin Co., Boston, 1975.

Pellets which cannot be identified with confidence should be collected for later identification by a biologist. Locations of these samples must be recorded.

HABITAT

HABITAT TYPES columns 56-61

Two habitat types may be entered in descending order of importance. If only one habitat type is applicable, space for the other should be left blank. Habitat types are separated into: Terrestrial Habitats, and Wetland Habitats.

TERRESTRIAL HABITATS

TAL - Talus: A unit dominated by talus. Generally little vegetation develops on talus due to its continuous downslope movement and its extremely poor moisture holding capacity.

CAV - Cave: A natural underground chamber that is open to the surface.

PAR - open forests (parkland): A unit of upland soils which have deep or moderately deep, medium textured morainal or colluvial materials, which are well-drained. These areas have either low precipitation or high evapotranspiration and are typically open forest or a transition forest/grassland.

FOC - dense conifer forest: Upland areas which have deep or moderately deep, medium textured morainal or colluvial materials, which are well drained. These areas have either high precipitation usually in the form of snow, or low evapotranspiration, and are typically dense conifer forests providing good canopy coverage but poor herbaceous growth.

MED - subalpine meadow: A unit of subalpine meadow occurring due to a combination of cold air temperature, imperfect to poor water drainage and cold air drainage. These areas are often concave in shape and receive moisture from upper slopes. The meadows support abundant herbaceous growth and are usually surrounded by subalpine forest.

KRU - krummholz forest: A unit of interrupted forest cover of stunted subalpine trees which is transitional to alpine tundra. These areas are typically found on convex or straight, moisture shedding slopes which are exposed to persistent wind and cold climate.

GRA - grasslands: A unit where a grassland becomes established, usually upland areas having deep or moderately deep medium textured morainal or colluvial materials. These areas have low precipitation and high evapotranspiration and typically include xeric tolerant shrubs and herbs.

URB - urban development: A unit that has a significant proportion of its area occupied by permanent urban development.

RNR - roads or railroads: A unit that has a significant proportion of its area occupied by transportation routes such as major highways and railroads.

IND - industrial development: A unit that has a significant proportion of its area occupied by industrial development such as tailings ponds, spoil areas or open pit mines.

ICE - snowfields and glaciers: A unit of permanent snow and ice.

CLF - cliff: A unit of steep, vertical, or overhanging rockface or compacted materials.

ALP - alpine tundra: A unit of virtually treeless high elevation mountains or plateaus. These areas often include considerable exposed bedrock.

AVA - avalanche tracks: A unit with modified vegetation as a result of avalanches. Forage production is generally enhanced because of the maintenance of early seral stages.

AGR - agricultural development: A unit of intense cultivation.

WETLAND HABITATS

Wetland habitat types are divided into two groups:

1) Upland, referring to wetland habitats above tidal water, and;
2) Coastal referring to habitats affected by tides.

1) UPLAND

SOW - Shallow Open Water: A wetland that is comprised of permanent shallow standing water and that lacks extensive emergent plant cover. Shallow open waters have an average mid-growing season depth of less than 2 m.

MAR - Marsh: Wetlands that are permanently or seasonally inundated and that support an extensive cover of emergent, non-woody vegetation rooting in mineral-rich substrate.

FEN - Fens: Wetlands comprised of *in situ* accumulations of well to poorly decomposed non-spaghnic peats. Most fens have in excess of 40 cm of peat accumulation.

BOG - Bogs: Wetlands comprised of *in situ* accumulations of poorly to moderately decomposed Spaghnum-derived peats. Bogs are generally very acidic.

SWA - Swamps: Tree dominated or tall shrub-dominated wetlands that are characterized by periodic flooding and nearly permanent subsurface water flow through various mixtures of mineral sediments and organic materials.

DRA - Drawdown zone: The area between full pool and low pool on reservoirs.

SHC - Shrub-Carrs: Low shrub-dominated wetlands developed on mineral materials that are periodically saturated but rarely inundated.

LAK - Lake: A small natural or artificial open body of standing water two hectares or greater in area.

PON - Pond: A natural or artificial open body of water occupying an area of less than two hectares.

RIV - River Channel: An area composed of a bed and banks which regularly or intermittently serve to confine water. Depth and current may vary considerably in relation to season and tide. Emergent and/or submergent vegetation may be present.

FLO - Floodplain: Flat land bordering a river subject to periodic flooding resulting in moisture and nutrient loving vegetation associations. Erosion and deposition frequently maintains patches of early seral vegetation.

2) COASTAL

SUB - Subtidal: Area below the lower low tide (chart datum) and thus permanently covered by brackish or marine water. Substrates may vary and submergent and/or floating aquatic plants may be present.

Subtidal areas may be described more specifically by employing one of the two habitat descriptions below.

SSO - Deep Subtidal: Offshore area with water depth of greater than 10 m at low tide. May support submergent and floating vegetation. Salinity may vary considerably through the water column.

SSS - Shallow Subtidal: Offshore area between low tide and 10 m below low tide. May support submergent and floating vegetation. Salinity may vary considerably through the water column.

INT - Intertidal: The area of tidal influence occurring between low low water, and mean high water. Mean high water can be recognized as the line immediately below the zone of driftlogs and below which woody vegetation does not usually occur.

Intertidal habitats may be described more specifically by employing one of the habitat descriptions below.

IBF - Intertidal Beach Face/Berm: An accumulation of unconsolidated materials within the upper intertidal at about the mean high water line of a beach. These are often ephemeral and of variable width. The berm is usually flat (although it may slope gently landwards) while the beach

face normally slopes gently seawards. Annual plants may colonize such areas but permanent vegetation is rarely established.

ISC - Intertidal Side Channel: Channel formed by fluvial processes and connected to the main river or stream. Current velocities and depth may vary considerably in relation to season and tide, however, the major influencing factors are riverine.

ICT - Intertidal Tide Channel: Channel resulting from and dominated by tidal processes. These drain the intertidal portion of the delta and are often characterized by silty organic bed materials and steep banks. Emergent and submergent vegetation is often present.

IFL - Intertidal Flats: Low gradient intertidal components which do not support significant (<15%) vascular vegetation. These often support diverse macro, micro and meio drift algae. Bars and troughs may be present in some situations.

IMA - Intertidal Marsh: A generally low gradient area which supports significant (>15%) non woody vascular vegetation for at least part of the year and is characterized by a surface accumulation of organic material deposited in water.

DISTANCE TO LAND/WATER columns 62-63

The average distance to nearest land or water should be indicated by the appropriate code listed below.

1 - <1 m
2 - 1 - 5 m
3 - 5 - 10 m
4 - 10 - 100 m
5 - 100+ m

This should be followed by the appropriate code L - Land or W - Water indicating the location of animal(s).

RANGE CONDITION column 64

Range condition is the present state of health of a range site in relation to the climax (natural potential) plant community for that site. It is an expression of the relative degree to which kinds, proportions, amounts and vigour of plants in a plant community resemble that of the climax plant community for the site. Range condition is basically an ecological rating. It is determined by observing those parameters of the plant community noted above, the amount of litter or mulch on the ground and the degree of erosion.

Forage plants can be classified according to their response to grazing. Climax plants that respond quickly to over utilization by decreasing are called DECREASERS. Usually they are perennials that produce much high quality forage. Species which respond to over utilization, at least initially, by increasing in relation to other plants in the community are called INCREASERS. They are generally low stature, less productive, subdominant species in the climax plant community. Their forage value ranges from low to high. When heavy grazing occurs those of low forage value tend to increase more rapidly than those of high value.

Those species which are not normally a part of the climax plant community, but invade and grow along with the increasers on over utilized sites are called INVADERS, regardless of their forage value.

Codes for range condition that may be entered on the data form are:

1. Excellent Range: At least 75% of the forage is comprised of decreasers. The plants are vigorous, have good root systems, and set a good crop of viable seed in most years. There is enough mulch on the ground to prevent erosion, conserve soil moisture and prevent winter-killing of plants. Rain soaks in rapidly.

2. Good Range: 50 to 75% of the forage is comprised of decreasers. The plants are vigorous and set an adequate crop of viable seed in most years. There is enough mulch to allow little erosion. Rain soaks in fairly rapidly.

3. Fair Range: 25 to 50% of the forage is comprised of decreasers, the rest made up of increasers, many of which are unpalatable. Some invaders are usually present. The decreaser plants lack vigour, have some killing at the crowns and set adequate seed crops in fewer than half the years. There is not usually enough mulch to prevent erosion. Rainfall soaks in poorly, causing considerable runoff and some sheet erosion.

4. Poor Range: Less than 25% of the forage is made up of decreasers and those present are generally in a weakened condition. Invaders and unpalatable increasers are abundant. Very little mulch is present, water runoff is frequent and the topsoil is generally compacted. Sheet and rill erosion is usually marked.

5. Not determined: Surveyor unable to determine range condition.

For further information regarding Range Condition it is suggested that the surveyor consult Range Management Handbook for British Columbia. Agriculture Canada Research Station Kamloops B.C., A McLean ed. 1979, 104 pp.

Prior to sampling an area, the local range agrologist should be consulted for examples of possible increaser, decreaser and invader species for that particular area. The following is an example of possible decreasers, increasers and invaders of a Ponderosa pine - Bunchgrass site:

Pinus ponderosa - Agropyron spicatum site

Decreasers	Increasers	Invaders
Agropyron spicatum	Balsamorhiza sagittata	Phlox diffusa
Festuca idahoensis	Artemesia tridentata	Taraxicum officinale
Festuca scabrella	Antennaria microphylla	Plantago spp.
	Koeleria macrantha	Bromus tectorum
	Chrysothamnus nauseosus	
	Poa sandbergii	
	Achillea millefolium	

Range condition ratings are most useful when applied to rangelands; that is, land on which the native vegetation (climax or natural potential) is predominantly grasses, grasslike plants, forbs or shrubs suitable for grazing or browsing by wildlife or livestock. Rangelands include Alpine tundra, Ponderosa pine - bunchgrass, most of the Interior Douglas-fir, coastal marshes and wet meadows.

In densely timbered types, there is generally very little forage, so the process of comparing the existing stand to the predicted climax stand is not meaningful; therefore do not rate forage potential for wildlife or domestic livestock in these areas. In these types, a grazable understory is produced only periodically, following clearcutting, extensive selective cutting or thinning, or fire. Do not determine range condition on these sites, rather, describe the present stage of successional status (#39 on the Site Description Form), the productivity and the utilization of the key forbs.

FORAGE UTILIZATION column 65

Utilization is noted in terms of "key forage plants" showing use by the following codes:

	% Utilization	Description
0	0	No utilization
1	1-5%	Trace
2	6-25%	Light
3	26-50%	Moderate
4	>50%	Heavy

To arrive at this determination, examine the key forage species, and estimate the amount (% of original) of the plant which has been consumed. A key forage species is generally a very palatable perennial which provides a major proportion of the available forage, and is a major component of the desired plant community (climax or successional stage, depending on management objectives). The utilization of these individual key forage species is assessed to provide this overall rating. A list of major ungulate winter forage species is provided on p. 26 of this manual.

FORM UTILIZATION (UTILIZATION FORM CLASS) column 66

For each browse species in the floristic list, indicate the appropriate form class code. The form classes and codes are from a U.S. Forest Service's (1969) Wildlife Surveys Handbook and are as follows:

Code	Form Class
1	all available, little or no hedging
2	all available, moderately hedged
3	all available, severely hedged
4	partly available, little or no hedging
5	partly available, moderately hedged
6	partly available, severely hedged
7	unavailable
8	dead

Availability is based on the portion of the plant used in previous winters. Form class estimates are limited to available portions of plants

and apply to only the parts of a plant used in previous winters. Form classes (Figure 5) are based upon the length and appearance of the previous year's growth (2-year-old wood). More than one class of hedging within the available portion of a plant is quite common. Therefore, the form class is based on the average condition of branch ends. It should be noted that the appearance of form classes may differ between species. For example, form class 2 or 4 in willow may be unlike form class 2 or 4 in serviceberry.

Form classes reflect availability and use of key browse plants. Leads on form class 3 and 6 plants are usually short and yield less forage than those on form class 2 and 5, or 1 and 4 plants.

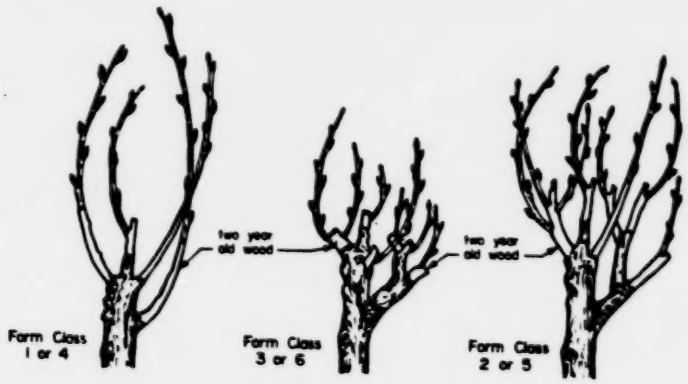


FIGURE 5 Utilization Form Classes (Degrees of Hedging)

In most shrub species, new leaders normally grow from terminal buds. Browsing of terminal buds causes lateral bud growth, thus altering the appearance of the shrub. If the previous year's growth is strongly altered or is relatively short then form class 3 or 6 (severely hedged) applies. If the previous years growth is only moderately altered, then form class 2 or 5 (moderately hedged) applies. Form class 1 or 4 (little or no hedging) should be applied if the previous years growth is only moderately altered (see Figure 5).

FORAGE SPECIES columns 67-73

Appropriate codes for up to three forage species may be entered in descending order of importance. Codes for common ungulate forage species

TABLE 1
KEY WINTER FORAGE PLANTS FOR B.C. UNGULATES*

CODE	SCIENTIFIC NAME	COMMON NAME	UNGULATE IMPORTANCE RANKING**								
			COAST DEER	MULE DEER	WHITE TAILED DEER	MTN. GOAT	BIGHORN SHEEP	ROOSE-VELT ELK	ROCKY MTN. ELK	MOOSE	CARIBOU
01	Abies spp.	true firs (balsam)	2	-2	-3	-2	-3	2	2	-2	2
02	Acer circinatum	vine maple	1	-3	-3	-2	-3	3	3	-3	3
03	Acer glabrum	Rocky Mountain maple (Douglas maple)	2	-1	-2	-1	-2	2	1	-2	3
04	Agropyron spp.	wheat grasses	3	-2	-2	-1	-1	3	1	-3	2
05	Alectoria spp.	arboreal alectoria lichen	1	-1	-2	-2	-3	2	3	-3	1
06	Amelanchier alnifolia	common Saskatoon	3	-1	-1	-2	-2	3	1	-1	3
07	Arbutus menziesii	Pacific madrone (arbutus)	1	-3	-3	-3	-3	2	3	-3	3
08	Arctostaphlos uva-ursi	kinnikinnick (bearberry)	3	-1	-2	-2	-2	3	3	-3	3
09	Artemesia figida	prairie sagebrush (pasture sage)	3	-1	-2	-3	-1	3	2	-3	3
10	Artemesia tridentata	big sagebrush	3	-2	-3	-3	-2	3	2	-3	3
11	Athyrium spp.	lady ferns	2	-3	-3	-1	-2	3	3	-3	3
12	Berberis spp.	Oregon-grapes	2	-2	-2	-2	-2	2	2	-3	3
13	Betula glandulosa	glandular birch (scrub birch)	3	-3	-3	-3	-3	3	2	-1	2
14	Betula occidentalis	western birch (water birch)	3	-2	-3	-3	-3	3	2	-1	3
15	Betula papyrifera	paper birch	3	-2	-3	-2	-3	3	2	-1	2
16	Blenchum spicant	deer fern	2	-3	-3	-3	-3	1	3	-3	3
17	Bromus spp.	brome grasses	3	-2	-3	-3	-2	3	1	-3	3
18	Carex spp.	sedges	3	-2	-2	-2	-1	2	2	-1	1
19	Ceanothus sanguineus	redstem ceanothus	1	-1	-2	-2	-3	3	2	-2	3
20	Ceanothus velutinus	snowbush ceanothus	3	-1	-2	-2	-3	3	2	-2	3
21	Cetraria spp.	arboreal cetraria lichen	2	-2	-3	-2	-3	2	3	-3	1
22	Chrysothamnus nauseosus	common rabbitbrush	3	-2	-3	-3	-2	3	2	-3	3
23	Cladonia spp.	cladonia lichens	3	-3	-3	-3	-2	3	2	-3	1
24	Cornus sericea	red-osier dogwood	2	-2	-2	-1	-3	1	2	-1	2
25	Corylus spp.	filberts (hazelnuts)	3	-2	-2	-3	-3	3	3	-2	3
26	Festuca spp.	fescue grasses	3	-3	-3	-1	-1	3	1	-3	2
27	Gaultheria shallon	salal	1	-3	-3	-3	-3	1	3	-3	3
28	Holodiscus discolor	oceanspray	2	-2	-3	-3	-3	3	3	-3	3
29	Juniperus communis	common juniper	3	-2	-3	-2	-3	3	2	-3	3
30	Lonicera involucrata	twinberry honeysuckle	3	-3	-3	-2	-3	2	3	-2	3

TABLE 1 (Continued)

CODE	SCIENTIFIC NAME	COMMON NAME	UNGULATE IMPORTANCE RANKING								
			COAST DEER	MULE DEER	WHITE TAIL DEER	MTN. GOAT	BIGHORN SHEEP	ROOSE-VELT ELK	ROCKY MTN. ELK	MOOSE	CARIBOU
31	Lupinus spp.	lupines	3	2	2	3	2	3	2	3	3
32	Menziesia ferruginea	Pacific menziesia (false azalea)	2	3	3	3	3	2	3	3	3
33	Oplopanax horridus	devil's club	3	3	3	3	3	1	2	3	3
34	Paxistima myrsinites	Oregon boxwood	3	1	2	1	3	3	2	1	1
35	Penstemon spp.	penstemons	3	1	2	2	3	3	3	3	3
36	Philadelphus lewisii	mock orange	3	2	2	3	3	3	2	3	3
37	Physocarpus spp.	ninebark	2	3	3	3	3	2	3	3	3
38	Populus tremuloides	trembling aspen	3	2	2	3	3	3	2	2	3
39	Populus balsamifera	black cottonwood/balsam poplar	3	3	2	2	2	1	3	2	3
40	Prunus spp.	wild cherries	2	2	2	3	3	3	1	2	3
41	Pseudotsuga menziesia	Douglas-fir	2	2	2	2	3	2	2	3	3
42	Poa spp.	blue grasses	3	3	2	2	1	3	2	3	3
43	Purshia tridentata	antelopebush (bitterbrush)	3	2	2	3	3	3	1	2	3
44	Rhamnus purshianus	cascara	1	3	3	3	3	2	2	3	3
45	Rhus glabra	smooth sumac	3	1	2	3	2	3	3	3	3
46	Ribes spp.	currants/gooseberries	2	3	3	3	3	2	3	3	3
47	Rosa spp.	roses	2	2	2	3	3	2	2	3	3
48	Rubus pedatus	five-leaved creeping raspberry	2	3	2	3	3	2	3	3	2
49	Rubus spectabilis	salmonberry	2	3	3	3	3	3	3	3	3
50	Rubus ursinus	Pacific trailing blackberry	1	3	3	3	3	2	3	3	3
51	***Salix spp.	willows	2	2	2	1	3	2	2	1	2
52	Sambucus spp.	elderberries	2	3	3	3	3	1	2	3	3
53	Sorbus spp.	mountain-ashes	3	3	3	3	3	2	3	1	2
54	Symphoricarpus spp.	snowberries	3	2	3	3	3	3	2	3	3
55	Taxus brevifolia	western yew	2	3	3	3	3	2	3	2	3
56	Thuja plicata	western red cedar	1	3	2	3	3	2	3	2	3
57	Tsuga heterophylla	western hemlock	2	3	3	3	3	1	3	3	3
58	Vaccinium spp.	huckleberries/blueberries	1	3	3	3	3	2	2	2	3
59	Viburnum edule	highbush cranberry	3	3	3	2	3	2	3	2	3
60	Koeleria macrantha	prairie koeleria (junegrass)	3	2	3	2	2	3	3	3	3

* From Blower in Press.

** Ranking Code: 1 - high importance
2 - moderate importance
3 - low importance

*** A wide range in palatability exists within the willows, varying from very high to low. "Upland willows", as a general group (e.g. Bebb's willow, Scouler's willow), are mainly highly palatable.

TABLE 2

CODES FOR COMMON WATERFOWL PLANT FOOD SPECIES

CODE	SCIENTIFIC NAME	COMMON NAME
01	*Medicago sativa*	alfalfa
02	*Agrostis* spp.	bent grasses
03	*Brasenia sherberi*	watershield
04	*Carex* spp.	sedges
05	*Ceratophyllum* spp.	hornwort
06	*Elodea* spp.	waterweed
07	*Echinochloa* spp.	barnyard grasses
08	*Lemna* spp., *Spirodela polyrhiza*, *Rhyzocarpus natans*	duck weeds
09	*Myriophyllum* spp.	water-milfoil
10	*Nuphar* spp.	water-lilies
11	*Nymphaea* spp.	pond-lilies
12	*Polygonum* spp.	knotweed/smartweed
13	*Potomogeton* spp.	pond weeds
14	*Ruppia maritima*	ditch-grass
15	*Sagittaria* spp.	arrowheads
16	*Salicornia* spp.	glasswort
17	*Scirpus* spp.	bulrush
18	*Spargonium* spp.	bur-reed
19	*Vallisneria* spp.	tape-grass
20	*Zizania aquatica*	wild-rice
21	*Zostera* spp.	eel-grass
22	*Enteromorpha* spp.	sea confetti
23	*Ulva* spp.	sea lettuce

are presented in Table 1 below. Because summer forage is not generally considered to limit ungulates the table includes only what are considered to be key winter forage species. A relative importance value is also included to assist the investigator. Codes for common waterfowl forage species are presented in Table 2.

Codes from the ungulate forage list may not be used for waterfowl and vice versa. If the investigator wishes to record other forage species or forage species for non ungulate or waterfowl species, entries may be recorded as comments.

HABITAT FACTORS (UNGULATES)

This section is oriented toward gathering some of the information necessary to estimate the present and potential carrying capacity of a site for ungulates. Carrying capacity for ungulates in an area depends on a myriad of factors many of which may be site or herd specific. Some major common factors considered in rating carrying capacity and theoretical capability used in the Terrestrial Studies Branch biophysical wildlife capability classification are: permanent human use of land; winter snow depth; general landform type; the ability of the area to produce suitable forage species; climatic factors other than snow depth; productivity of forage species; presence of suitable vegetative cover; and for some species the presence of special landform types nearby such as escape terrain for mountain sheep and mountain goats or escape cover for other species. Two further factors important in rating capability but not present carrying capacity are 1) the ease of maintaining the vegetative cover at a seral state suitable for the ungulate species being considered; and 2) potential productivity of forage.

A rating scale for these factors is described below:

ANTHROPOGENIC column 74

Included within this habitat factor are human activity that has

permanently altered the lands natural capability. Some factors (environmental conditions) considered to effect capability in wildlife biophysical capability mapping are: urban development; roads or railroads; cultivation; industrial development; and drawdown zones around reservoirs (see Demarchi et al., 1982). These factors can be rated on a scale of 1-6 as follows:

1. Capability is not significantly reduced (95-100% of undisturbed). Includes normal logging disturbance, moderate mining exploration, agricultural use and other human disturbances considered reversible.

2. Capability is moderately reduced (75-95% of undisturbed) - Examples - oil or mineral exploration severe logging disturbance involving extensive sidecasting or erosion).

3. Capability is slightly reduced (50-75%) of undisturbed) - Examples - extreme oil or mineral exploration disturbance.

4. Capability is severely reduced (25-50% of undisturbed) - Examples - mining, extensive road construction and other disturbance as in extreme coal exploration.

5. Capability is extremely reduced (5-25% of undisturbed) - Examples - mining in areas where reclamation is difficult.

6. Capability is almost totally destroyed (<5% of undisturbed) - Examples - urban development or impoundments.

SNOW column 75

Depth of snow limiting to ungulate use varies with snow quality, forage type and ungulate species age and sex. Values specified as limiting are therefore approximate guides only. Under average conditions critical snow depths for ungulate species are generally as follows: mountain goats, mountain sheep and deer .5 m; elk .75 m; caribou and moose 1. m (Blower, 1971).

Some other factors to be considered in assigning snow ratings which are snow depth, intensified solar radiation, windsweeping and presence of permanent snow fields (Demarchi et al, 1982). Temperature factors which affect snowpack duration should also be taken into account when rating. These factors can be rated on a scale of 1-6 as follows:

1. Low snow depths - Snow exceeds critical depths for the species under consideration in 0-5% of years (<1 in 20).

2. Moderate snow depths - Snow exceeds critical depths for the species under consideration in 5-25% of years (1-5 in 20).

3. Moderately high snow depth - Snow exceeds critical depths for the species under consideration in 25-50% of years (5-10 in 20).

4. High snow depth - Snow exceeds critical depths for species under consideration in 50-75% of years (10-15 in 20).

5. Very high snow depth - Snow exceeds critical depth for the species under consideration for 75-95% of years (15-19 years in 20).

6. Extremely high snow depth - Snow exceeds critical depth for the species under consideration in 95-100% of years (> 19 in 20).

CLIMATE column 76

Included within this habitat factor are climatic conditions other than snow depth which affect ungulate use of areas. Only direct effects on ungulates should be considered.

It should be noted that climate ratings are not applied without consideration of season of use. For example for winter range rating, cold air layers, frost pockets, wind exposure, and intensified solar radiation should be taken into account (see Demarchi et al., 1982). Some factors to consider in rating summer ranges for moose and caribou are high heat, wind

exposure, and presence of permanent snow and ice. The latter two are important in reducing insect harassment.

Ratings for this category follow:

1. Climatic factors do not significantly affect the use of the map unit.

2. Climatic factors slightly reduce use of the map unit (carrying capacity is 75-95% of potential).

3. Climatic factors moderately reduce use of the map unit (carrying capacity is 50-75% of potential).

4. Climatic factors severely reduce use of the map unit (capability is reduced to 25-50% of potential) for the species under consideration.

5. Climatic factors extremely reduce the use of the map unit (capability is reduced to 5-25% of potential) for the species under consideration.

6. Climatic factors preclude or nearly preclude the use of the map unit (capability is reduced to <5%) for the species under consideration. Winter examples are extreme wind exposure especially for species such as deer. Severe climatic factors for summer use are high heat such as is common at low elevations in the interior most affecting species such as moose and caribou.

LANDFORM column 77

Ungulates respond in species specific ways to landform configuration. Studies of cattle, elk and mule deer competition, for instance, have shown that these species respectively utilize progressively steeper terrain

(Julander and Jeffery, 1964; Mackie, 1970). White-tailed deer on the other hand tend to select bottom lands (Mackie, 1970) as do moose.

Most desirable (i) and least desirable (ii) terrain features for various ungulate species are described below:

Moose: (i) A floodplain adapted species with a broad tolerance for rolling and moderately steep terrain, moose may be locally abundant in rolling alpine habitat particularly during the summer.

(ii) Extremely rough terrain such as talus slopes and rock bluffs and slopes of greater than 100% are avoided.

Elk: (i) A species with a broad tolerance to many different types of landforms. Ideal landforms range from floodplain areas with adjacent river "breaks" to steep avalanche tracts that are greater than 100% slope.

(ii) Talus slopes and rock bluffs are avoided.

Black-tailed Deer: (i) Broad landform tolerance as they occupy flat to extremely steep coastal mountain situations. Ideal habitat includes steep areas with small rock outcroppings. Males (more likely than females) frequent broken ledgy terrain (Connolly, 1978). Black-tailed deer utilize the steepest terrain of American Cervidae.

(ii) Areas of extensive rock bluffs are avoided.

Interior Mule Deer: (i) Broad tolerance for a variety of landform types. Mule deer can occupy flat to very steep mountainous terrain. This is a deer of steep broken terrain, and floodplains, with a preference for rolling to mountainous landforms. Summer habitat is typically alpine with migration to valley bottoms and lower slopes for the winter. Steep south facing slopes are ideal early spring range as such areas "green up" quickly.

(ii) Mule deer avoid extensive flat areas that are devoid of trees or rock bluffs.

White-tailed Deer: (i) Compared to mule deer, white-tailed deer favour flatter land. In B.C. they are restricted to, floodplains and lower mountain slopes and terraces.

(ii) White-tailed deer avoid areas of extensive steep slopes, alpine habitats or steep, rocky areas.

Mountain Sheep: (i) Thinhorn and Bighorn sheep are mountain animals, that are always associated with steep slopes. They forage on flat terrain if steep, escape terrain (slopes greater than 100%) is nearby (within .5 km). Summer range is usually alpine tundra. Most bighorn sheep and some thinhorn sheep descend to lower drier southern facing slopes in winter.

(ii) Mountain sheep avoid extensive flat areas and floodplains.

Mountain Goats: (i) Mountain goats inhabit steep, rocky mountainous, terrain. They prefer steep, alpine, talus slopes at the base of cliffs, but, may also frequent narrow ledges on the face of steep cliffs or rocky ridges, or rolling alpine meadows which are adjacent to rugged escape terrain (Banfield, 1974).

(ii) Mountain goats avoid areas that are devoid of rugged escape terrain, such as floodplains, extensive flat or rolling areas or most lower mountain areas.

Caribou: (i) Caribou are essentially an alpine species. They prefer broad tundra-like rolling alpine terrain, but the cows, calve or steep, narrow rocky, alpine ridges, and considerable foraging occurs in marsh or bogs. They also have a broad tolerance to a variety of landforms when migrating between summer and winter ranges.

(ii) Caribou avoid rock bluffs.

These landform factors are rated on a scale of 1-6 for each ungulate species where ideal landform types are considered unlimiting and rated 1, and unsuitable landforms are rated 6. These six categories are:

1. Landforms are ideal or nearly ideal for the species being rated.

2. Use of the area is slightly reduced (75-95% of potential) by landform factors described above for the species being rated.

3. Use of the area is moderately reduced (50-75% of potential) by landform factors described above for the species being rated.

4. Use of the area is moderately reduced (25-50%) of potential by landform factors. Factors resulting in such a situation include steep terrain affecting locomotion of the species being rated, or for those species associated with mountains, lands with less than sufficient slope to provide escape terrain.

5. Use of the area is extremely reduced (5-25% of potential) by landform factors. An example of this type of situation is steep terrain severely limiting motion of the ungulate species being rated or flat or rolling land in the case of mountain sheep and goats.

6. Capability is almost nil due to unsuitable landform (<5% of potential). Examples include extemely steep terrain for artiodactyls or flatlands in the case of mountain sheep and mountain goats.

PRESENT ADJACENT ESCAPE TERRAIN/COVER column 78

This rating category is divided into two sections because of the two distinct types of escape habitat utilized by ungulates. Whereas mountain goat, sheep, and mule deer utilize terrain to escape predators, moose, elk, white-tailed deer and black-tailed deer utilize vegetative cover. Caribou may utilize either. Because of this, two rating schemes have been developed, one for species and situations where terrain is used for escape and the other where cover is used.

ADJACENT TERRAIN

Some ungulate species are dependent on combinations of landforms rather than simple units. Mountain goats and mountain sheep for example seldom forage far from steep cliffs (escape terrain). Ratings for influence of adjacent escape terrain follow:

1. The use of the map unit is not limited significantly by type, form or proximity of escape terrain.

2. Use of the map unit is slightly reduced (75-95% of potential) by adjacent escape terrain. Some examples of this type of effect are described above.

3. Use of the map unit is moderately reduced (50-75% of potential) by the type of adjacent escape terrain.

4. Use of the map unit is severely reduced (25-50% of potential) by the type of adjacent escape terrain. Some examples of such a situation are areas with marginal adjacent escape terrain for sheep and goats, or escape terrain more distant than these species normally forage from.

5. Use of the map unit is extremely reduced (5-25% of potential) by lack of adjacent escape terrain. An example of this situation are areas distant from suitable escape terrain for mountain goats and sheep.

6. Inadequate escape terrain preclude for all practical purposes the use of the map unit by the ungulate species under consideration. Some examples of this situation are lack of escape terrain for mountain goats and sheep.

PRESENT ADJACENT COVER

Species such as elk, deer and moose rely on cover (forests) rather than terrain for escape habitat. A map unit being rated may lack capability to produce escape cover but this deficiency can be made up by an adjacent map unit. Ratings for this category follow:

1. Present adjacent cover does not significantly affect the potential of the area being rated.

2. The lack of ideal present adjacent cover conditions reduces the use of the area being rated (75-95% of potential) for the species under consideration.

3. The lack of ideal present adjacent cover conditions moderately reduces (50-75% of potential) the use of the area being rated for the species under consideration.

4. The lack of ideal present adjacent cover conditions severely reduces (75-95% of potential) the use of the area being rated for the species under consideration.

5. The lack of ideal present adjacent cover conditions extremely reduces (5-25% of potential) the use of the map unit being rated for the species under consideration.

6. The lack of ideal present adjacent cover conditions precludes use of the area being rated for the species under consideration.

POTENTIAL ADJACENT ESCAPE COVER column 79

This rating is similar to Adjacent Escape Terrain/Cover but is for capability rather than present condition landforms by nature are present rather than potential and are therefore not considered here. To assess

capability the history of the site should be considered and extrapolations made from similar areas in different seral stages. Ratings for this category follow:

1. Potential escape cover of adjacent map units does not significantly affect the carrying capacity of the area being rated.

2. Potential escape cover of adjacent map units slightly reduces the use of the map unit being rated (75-95% of potential) for the species under consideration.

3. Potential escape cover of adjacent area moderately reduces (50-75% of potential) the use of the area being rated for the species under consideration.

4. Potential escape cover of adjacent map units severely reduces (25-50% of potential) the use of the area being rated for the species under consideration.

5. Potential escape cover on adjacent map units extremely reduces (5-25% of potential) the use of the area being rated for the species under consideration.

6. Potential escape cover on adjacent map units precludes use of the area being rated for the species under consideration.

PRESENT FORAGE SPECIES column 80

This is a rating of the current production of forage species on a map unit. To apply the rating the percentage of major forage species (see Table 1) on the site is assessed. Forage species are generally those constituting the herb and shrub layers. Ratings for this category follow:

1. Forage plants identified for the rated animal species constitute 95-100% of available forage species.

2. Forage plants identified for the rated animal species constitutes 75-95% of available forage species.

3. Forage plants identified for the rated animal species constitutes 50-75% of available forage species.

4. Forage plants identified for the rated animal species constitutes 25-50% of available forage species.

5. Forage plants identified for the rated animal species constitutes 5-25% of available forage species.

6. Forage plants identified for the rated animal species constitutes <5% of available forage species.

POTENTIAL FORAGE SPECIES column 81

This rating is comparable to the present forage species rating but must be done by extrapolation unless the site is at an ideal successional stage for the ungulate species being rated. To extrapolate from other sites, examine areas with similar soils, aspect and other ecological variables which are near an ideal successional stage for the ungulate species being rated. Ratings for potential forage species follow:

1. Forage plants identified for the rated animal species constitutes 95-100% of available forage species.

2. Forage plants identified for the rated animal species constitutes 75-95% of available forage species.

3. Forage plants identified for the rated animal species constitutes 50-75% of available forage species.

4. Forage plants identified for the rated animal species constitutes 25-50% of available forage species.

5. Forage plants identified for the rated animal species constitutes 5-25% of available forage species.

6. Forage plants identified for the rated animal species constitutes <5% of available species of herb and shrub layer.

PRESENT FORAGE PRODUCTION column 82

This category rates the production of forage on a site. The rating scale is derived from the forage capability classification developed by Demarchi and Harcombe (1982) but the ratings are for the existing rather than the ideal seral situation.

Present forage production is rated on a scale of 1-5 as follows:

1. Production of herbaceous plants, lichens and/or browse on these map units is very high. Production is from 1000 to 2000 kg/ha/yr of herbage or canopy coverage is 50-100% browse or canopy coverage is 50-100% terrestrial lichens or have a biomass of 1000 to 2000 kg/ha of arboreal lichens.

2. Production of herbaceous plants, lichens, and/or browse is high. Production is from 500-1000 kg/ha/yr of herbage or canopy coverage can be 25 to 50% browse; or canopy coverage can be 25-50% terrestrial lichens or a biomass of 500 to 1000 kg/ha of arboreal lichens.

3. Production of herbaceous plants, lichens and/or browse is moderate. Production is from 225 to 500 kg/ha/yr of herbage or canopy coverage is 10 to 25% browse, or canopy coverage can be 10-25% terrestrial lichens or arboreal lichen biomass is 225 to 500 kg/ha.

4. Production of herbaceous plants, lichens and/or browse is low. Production is from 110 to 225 kg/ha/yr of herbage or canopy coverage is 5 to 10% browse; or canopy coverage 5 to 10% terrestrial lichens or arboreal lichen biomass is 110 to 225 kg/ha.

5. Production of herbaceous plants, lichens and/or browse is very low to none. Production ranges from 0 to 110 kg/ha/yr of herbage, or canopy coverage of 0 to 10% browse, or canopy coverage of 0 to 10% ground lichens or biomass of 0 to 110 kg/ha of arboreal lichens.

POTENTIAL FORAGE PRODUCTION column 83

A forage capability classification has been developed by Demarchi and Harcombe (1982). It is a rating of the ability of a site to produce given quantities of forage for the assigned ungulate species. It is important to note that this rating is a sum of the information that have been derived on the Vegetation Description Form; it relates to the potential of the site to produce forage; and, for the purpose of the Wildlife Data Form is rated as it is applied to the needs of individual wildlife species.

Potential forage production is rated on a scale of 1-5 as follows:

1. Capability to produce herbaceous plants, lichens, and/or browse on unit is very high. These units can produce 1000 to 2000 kilograms/hectare/year of herbage; or, can have a canopy coverage of 50 to 100 percent browse; or, can have a canopy coverage of 50 to 100 percent terrestrial lichens; or, can have a biomass of 1000 to 2000 kilograms/hectare of arboreal lichens.

2. Capability to produce herbaceous plants, lichens, and/or browse on unit is high. These units can produce 500 to 1000 kilograms/hectare/year of herbage; or, can have a canopy coverage of 25 to 50 percent browse; or, can have a canopy coverage of 25 to 50 percent terrestrial lichens; or, can have a biomass of 500 to 1000 kilograms/hectare of arboreal lichens.

3. Capability to produce herbaceous plants, lichens, and/or browse on unit is moderate. These units can produce 225 to 500 kilograms/hectare/year of herbage; or, can have a canopy coverage of 10 to 25 percent browse; or, can have a canopy coverage of 10 to 25 percent terrestrial lichens; or, can have a biomass of 225 to 500 kilograms/hectare of arboreal lichens.

4. Capability to produce herbaceous plants, lichens, and/or browse on unit is low. These units can produce 110 to 225 kilograms/hectare/year of herbage; or, can have a canopy coverage of 5 to 10 percent browse; or, can have a canopy coverage of 5 to 10 percent terrestrial lichens; or, can have a biomass of 110 to 225 kilograms/hectare of arboreal lichens.

5. Capability to produce herbaceous plants, lichens, and/or browse on unit is very low to none. These units can produce 0 to 110 kilograms/hectare/year of herbage; or, can have a canopy coverage of 0 to 10 percent browse; or, can have a canopy coverage of 0 to 10 percent ground lichens; or, can have a biomass of 0 to 110 kilograms/hectare of arboreal lichens.

EASE OF MAINTENANCE OF THE OPTIMAL SERAL CONDITION column 84

Habitat manipulation (management) may be required in order to keep an area productive for an ungulate species. The degree of manipulation required is rated as follows:

1. No manipulation or minor management is required such as burning every 50-100 years.

2. Moderate manipulation required - occasional burning or clearing on 20-50 year intervals.

3. Relatively frequent burning or clearing is required every 10-20 years; or special burning techniques such as burns in consecutive years are required.

4. Frequent burning or clearing is required. Every 5 to 10 years.

5. Very frequent burning or clearing is required.

6. Treatment would be impractical.

PRESENT SUITABILITY column 85

Present suitability is the carrying capacity of an area as currently expressed. This category represents a synthesis of the ratings of current condition described above. For more details of these ratings see Demarchi et al., 1982. Carrying capacity rating descriptions in animals per km^2 er year follow:

1. Suitability to support ungulates is very high. Carrying capacities are in excess of 20 for black-tailed deer, 17 for white-tailed deer and mule deer, 12 for mountain sheep, 10 for elk, 8 for caribou and 6 for mountain goat and moose.

2. Suitability to support ungulates is high. Carrying capacities are 15 to 20 for black-tailed deer, 12-16 for white-tailed deer and mule deer, 9-12 for mountain sheep, 8-10 for elk, 6-7 for caribou, 5 for goat, and 4-5 for moose.

3. Suitability to support ungulates is moderate. Carrying capacities are 8-14 for black-tailed deer, 6-11 for white-tailed deer and mule deer, 5-8 for mountain sheep, 4-7 for elk, 3-5 for caribou, 3-4 for mountain goat, and 3 for moose.

4. Suitability to support ungulates is low. Carrying capacities are 2-7 for black-tailed deer, 1-5 for white-tailed deer and mule deer, 1-4 for mountain sheep, 1-3 for elk, 1-2 for caribou, goat and moose.

5. Suitability to support ungulates is very low. Carrying capacities are <2 for black-tailed deer and <1 for all other ungulate species.

6. Map units in this class have no capacity to support the ungulate species being rated for.

CAPABILITY column 86

Capability is the ability of the land under the prevailing climate to sustain the ungulate species under consideration with a given management input including prescribed burning grazing by cattle, prescribed logging or protection from deleterious land practice. For a more comprehensive description of capability see Demarchi et al., 1982.

Capability in animals per km^2 per year is rated on a scale of 1-6 as follows:

1. Capability to support ungulates is very high. Under good management carrying capacities are in excess of 20 for black-tailed deer, 17 for white-tailed deer and mule deer, 12 for mountain sheep, 10 for elk, 8 for caribou, 6 for goats and moose.

2. Capability to support ungulates is high. Under good management carrying capacities are 15-20 for black-tailed deer, 12-16 for white-tailed deer and mule deer, 9-12 for mountain sheep, 8-10 for elk, 6-7 for caribou, 5 for goats, and 4-5 for moose.

3. Capability to support ungulates is moderate. Under good management carrying capacities are 8-14 for black-tailed deer, 6-11 for white-tailed deer and mule deer, 5-8 for mountain sheep, 4-7 for elk, 3-5 for caribou, 3-4 for mountain goat, and 3 for moose.

4. Capability to support ungulates is low. Optimal carrying capacities are 2-7 for black-tailed deer, 1-5 for white-tailed deer and mule deer, 1-4 for mountain sheep, 1-3 for elk, 1-2 for caribou, goat and moose.

5. Suitability to support ungulates is very low. Optimal carrying capacities are less than 2 for black-tailed deer and less than 1 for all other ungulate species.

6. Map units in this class have no capacity to support the ungulate species being rated for.

COMMENTS columns 42, 49, 55, 73, and 87

Several comments fields are present on the data form. Information which is not accomodated by particular codes may be entered in the form of comments. Comments specific to a data field should be numbered chronologically and recorded adjacent to the appropriate number in the comments section at the bottom of the form.

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APPENDIX

SPECIES CODES FOR TERRESTRIAL VERTEBRATES OF BRITISH COLUMBIA

Amphibians and Reptiles

Salamanders	Caudata	
Tiger Salamander	Ambystoma tigrinum	TISA
Northwestern Salamander	Ambystoma gracile	NWSA
Long-toed Salamander	Ambystoma macrodactylum	LTSA
Pacific Giant Salamander	Dicamptodon ensatus	PGSA
Roughskin Newt	Taricha granulosa	RONE
Western Redback Salamander	Plethodon vehiculum	WRSA
Ensatina	Ensatina eschscholtzi	ENSA
Clouded Salamander	Aneides ferreus	CLSA
Frogs and Toads	Anura	
Tailed Frog	Ascaphus truei	TAFR
Great Basin Spadefoot toad	Scaphiopus intermontanus	GBST
Western Toad	Bufo boreas	WETO
Northern Chorus Frog	Pseudacris triseriata	NCFR
Pacific Treefrog	Hyla regilla	PATR
Red-legged Frog	Rana aurora	RLFR
Wood Frog	Rana sylvatica	WOFR
Spotted Frog	Rana pretiosa	SPFR
Northern Leopard Frog	Rana pipiens	NLFR
Bullfrog	Rana catesbeiana	BULL
Green Frog	Rana clamitans	GRFR
Turtles	Testudines	
Snapping Turtle	Chelydra serpentina	SNTU
Western pond Turtle	Clemmys marmorata	WPTU
Painted Turtle	Chrysemys picta	PATU
Reeve's Turtle	Chinemys reevesi	RETU
Green Turtle	Chelonia mydas	GRTU
Leatherback	Dermochelys coriacea	LEAT
Lizards		
Short-horned Lizard	Phrynosoma douglassi	SHLI
Western Skink	Eumeces skiltonianus	WESK
Northern Alligator Lizard	Gerrhonotus coeruleus	NALI
Snakes	Serpentes	
Rubber Boa	Charina bottae	RUBO
Sharptail Snake	Contia tenuis	SHSN
Racer	Coluber constrictor	RACE
Gopher Snake	Pituophis melanoleucus	GOSN
Common Garter Snake	Thamnophis sirtalis	CGSN

Northwestern Garter Snake	Thamnophis ordinoides	NGSN
Western Terrestrial Garter Snake	Thamnophis elegans	WTGS
Night Snake	Hypsiglena torquata	NISN
Western Rattlesnake	Crotalus viridis	WERA
Mammals		
Marsupials	Marsupialia	
Virginia Opossum	Didelphis virginiana	VIOP
Insectivores	Insectivora	
Masked Shrew	Sorex cinereus	MSSH
Vagrant Shrew	Sorex vagrans	VASH
Water Shrew	Sorex palustris	WASH
Pacific Water Shrew	Sorex bendirii	PWSH
Arctic Shrew	Sorex arcticus	ARSH
Trowbridge's Shrew	Sorex trowbridgii	TRSH
Pygmy Shrew	Microsorex hoyi	PYSH
Shrew-mole	Neurotrichus gibbsii	SHMO
Townsend's Mole	Scapanus townsendii	TOMO
Coast Mole	Scapanus orarius	COMO
Bats	Chiroptera	
California Myotis	Myotis californicus	CAMY
Small-footed Myotis	Myotis subulatus	SFMY
Yuma Myotis	Myotis Yumanensis	YUMY
Little Brown Myotius	Myotis lucifugus	LBMY
Long-legged Myotis	Myotis volans	LLMY
Fringed Myotis	Myotis thysanodes	FRMY
Keen's Myotis	Myotis keenii	KEMY
Long-eared Myotis	Myotis evotis	LEMY
Silver-haired Bat	Lasionycteris noctivagans	SHBA
Big Brown Bat	Eptesicus fuscus	BBBA
Red Bat	Nycteris borealis	REBA
Hoary Bat	Nycteris cinerea	HOBA
Spotted Bat	Euderma maculatum	SPBA
Townsend's Big-eared Bat	Plecotus townsendii	TBEB
Pallid Bat	Antrozous pallidus	PABA
Big Free-tailed Bat	Tadarida macrotis	BFTB
Pikas, Rabbits and Hares	Lagomorpha	
Collared Pika	Ochotona collaris	COPI
Pika	Ochotona princeps	PIKA
Eastern Cottontail	Sylvilagus floridanus	EACO
Nuttall's Cottontail	Sylvilagus nuttallii	NUCO
Snowshoe Rabbit hare	Lepus americana	SNRA
White-tailed Jack Rabbit Hare	Lepus townsendii	WTJR

Rodents

Mountain Beaver	Aplodontia rufa	MOBE
Least Chipmunk	Eutamias minimus	LECH
Yellow-pine Chipmunk	Eutamias amoenus	YPCH
Townsend's Chipmunk	Eutamias townsendii	TOCH
Red-tailed Chipmunk	Eutamias ruficaudus	RTCH
Woodchuck	Marmota monax	WOOD
Yellow-bellied Marmot	Marmota flaviventris	YBMA
Hoary Marmot	Marmota caligata	HOMA
Vancouver Marmot	Marmota vancouverensis	VAMA
Columbian Ground Squirrel	Spermophilus columbianus	CGSQ
Arctic Ground Squirrel	Spermophilus parryii	AGSQ
Golden-mantled Ground Squirrel	Spermophilus lateralis	GMGS
Cascade Golden-mantled Ground Sq	Spermophilus saturatus	CGGS
Gray Squirrel	Sciurus carolinensis	GRSQ
Red Squirrel	Tamiasciurus hudsonicus	RESQ
Douglas' Squirrel	Tamiasciurus douglasii	DOSQ
Northern Flying Squirel	Glaucomys sabrinus	NFSQ
Northern Paoket Gopher	Thomomys talpoides	NPGO
Beaver	Castor canadensis	BEAV
Great Basin Pocket Mouse	Perognathus parrus	GBPM
Western Harvest Mouse	Reithrodontomys megalotis	WHMO
Deer Mouse	Peromyscus maniculatus	DEMO
Bushy-tailed Wood Rat	Neotoma cinerea	BTWR
Northern Red-backed Vole	Clethrionomys rutilus	NRBV
Gapper's Red-backed Vole	Clethrionomys gapperi	GRBV
Heather Vole	Phenacomys intermedius	HEVO
Meadow Vole	Microtus pennsylvanicus	MEVO
Montane Vole	Microtus montanus	MOVO
Townsend's Vole	Microtus townsendii	TOVO
Tundra Vole	Microtus oeconomus	TUVO
Long-tailed Vole	Microtus longicaudus	LTVO
Creeping Vole	Microtus oregoni	CRVO
Water Vole	Microtus richardsoni	WAVO
Brown Lemming	Lemmus sibiricus	BRLE
Northern Bog Lemming	Synaptomys borealis	NBLE
Meadow Jumping Mouse	Zapus hudsonicus	MJMO
Western Jumping Mouse	Zapus Princeps	WJMO
Pacific Jumping Mouse	Zapus trinotatus	PJMO
House Mouse	Mus Musculus	HOMO
Black Rat	Rattus rattus	BLRA
Norway Rat	Rattus norvegicus	NORA
Muskrat	Ondatra zibethicus	MUSK
Porcupine	Erethizon dorsatum	PORC
Nutria	Myocastor coypus	NUTR

Carnivores	Carnivora	
Coyote	Canis latrans	COYO
Gray Wolf	Canis lupus	GRWO
Red Fox	Vulpes vulpes	REFO
Black Bear	Ursus americana	BLBE
Grizzly Bear	Ursus arctos	GRBE
Raccoon	Procyon lotor	RACC
Marten	Martes americana	MART
Fisher	Martes pennanti	FISH
Ermine	Mustela erminea	ERMI
Least Weasel	Mustela nivalis	LEWE
Long-tailed Weasel	Mustela frenata	LTWE
Mink	Mustela vison	MINK
Wolverine	Gulo luscus	WOLV
Badger	Taxidea taxus	BADG
Spotted Skunk	Spilogale putorius	SPSK
Striped Skunk	Mephitis mephitis	STSK
River Otter	Lutra canadensis	RIOT
Sea Otter	Enhydra lutris	SEOT
Mountain Lion	Felixa concolor	MOLI
Lynx	Lnyx canadensis	LYNX
Bobcat	Lnyx rufus	BOBC
Cloven-Hoofed Mammals	**Artiodactyla**	
Wapiti	Cervus elaphus	WAPT
Rocky Mountain Elk	(C.e. nelsoni)	RMEL
Roosevelt Elk	(C.e. roosevelti)	ROEL
Black-tailed Deer	Odocoileus hemionus	BTDE
Columbian Black-tail Deer	(O.h. columbiana)	CBTD
Mule Deer	(O.h. hemionus)	MUDE
White-tailed Deer	Odocoileus virginiana	WTDE
Fallow Deer	Dama dama	FADE
Moose	Alces alces	MOOS
British Columbia Moose	(A.a. andersoni)	BCMO
Alaska Moose	(A.a. gigas)	ALMO
Yellowstone Moose	(A.a. shirasi)	YEMO
Caribou	Rangifer tarandus	CARI
Bison	Bison bison	BISO
Mountain Goat	Oreamnos americanus	MTGO
Mountain Sheep	Ovis canadensis	MOSH
California Bighorn Sheep	(O.c. californiana)	CBSH
Rocky Mountain Bighorn Sh.	(O.c. canadensis)	RMBS
Dall's Sheep	Ovis dalli	DASH
Stone Sheep	(O.d. stonei)	STSH
Whales and Porpoises - Cetacea		
Dall's Porpoise	Phocoenoides dalli	DAPO
Dwarf Sperm Whale	Kogia simus	DSWH
Sperm Whale	Physeter catodon	SPWH

Baird's Beaked Whale	Berardius bairdii	BBWH
Hubb's Beaked Whale	Micropteron carlhubbsi	HBWH
Steineger's Beaked Whale	Micropteron stejnegeri	SBWH
Cuvier's Beaked Whale	Ziphius cavirostris	CBWH
Gray Whale	Eschrichtius gibbosus	GRWH
Minke Whale (1)	Balaenoptera acutorostrata (B.a. davidsoni)	MIWH
Sei Whale (1)	Balaenoptera borealis (B.b. borealis)	SEWH
Fin Whale (1)	Balaenoptera physalus (B.p. physalus)	FIWH
Blue Whale (1)	Balaeonoptera musculus (B.m. musculus)	BLWH
Humpback Whale	Megaptera novaeangliae	HUWH
Northern Right Whale (1)	Balaena glacialis (B.g. japonica)	NRWH
Striped Dolphin (1) (Blue Dolphin)	Stenella coeruleoalba (S.c. euphrosyne)	STDO
Common Dolphin	Delphinus delphis	CODO
Northern Right-whale Dolphin	Lissodelphis borealis	NRWD
Pacific Write-sided Dolphin	Lagenorhynchus obliquidens	PWSD
Killer Whale	Orcinus orca	KIWH
Risso's Dolphin	Grampus griseus	RIDO
Short-finned Pilot Whale	Globicephala sieboldii	SFPW
Harbor Porpoise	Phocoena phocoena	HAPO
Seals and Sea Lions - Pinnipedia		
Northern Fur Seal	Callorhinus ursinus	NFSE
Northern Sea Lion	Eumetopias jubata	NSLI
California Sea Lion	Zalophus californianus	CSLI
Harbor Seal (1) (Hair Seal)	Phoca vitulina (P.v. richardii)	HASE
Northern Elephant Seal	Mirounga angustirostris	NESE
Birds		
Loons	Gaviiformes	
Common Loon	Gavia immer	COLO
Yellow-billed Loon	Gavia adamsii	YBLO
Arctic Loon	Gavia arctica	ARLO
Red-throated Loon	Gavia stellata	RTLO
Grebes	Podicipediformes	
Red-Necked Grebe	Podiceps grisegena	RNGR
Horned Grebe	Podiceps auritus	HOGR
Eared Grebe	Podiceps nigricollis	EAGR
Western Grebe	Aechmophorus occidentalis	WEGR
Pied-billed Grebe	Podilymbus podiceps	PBGR

Albatrosses, Shearwater and Allies	Procellariiformes	
Short-tailed Albatross	Diomedea albatrus	STAL
Black-footed Albatross	Diomedea nigripes	BFAL
Larpan Albatross	Diomedea immutabilis	LAAL
Northern Fulmar	Fulmarus glacialis	NOFU
Pink-footed Shearwater	Puffinus creatopus	PFSH
Flesh-footed Shearwater	Puffinus corneipes	FFSH
Sooty Shearwater	Puffinus griseus	SOSH
Manx Shearwater	Puffinus puffinus	MASH
Fork-tailed Storm Petrel	Oceanodroma furcata	FTSP
Leach's Storm Petrel	Oceanodroma leucorhoa	LEST
Pelicans, Cormorants and allies	Pelecaniformes	
White Pelican	Pelecanus erythrorhynchos	WHPE
Brown Pelican	Pelecanus occidentalis	BRPE
Double-Crested Cormorant	Phalacrocorax auritus	DCCO
Brandt's Cormorant	Phalacrocorax penicillatus	BRCO
Pelagic Cormorant	Phalacrocorax pelagicus	PECO
Herons, Bitterns	Ciconiiformes	
Great Blue Heron	Ardea herodias	GBHE
Green Heron	Butorides striatus	GRHE
Cattle Egret	Bubulcus ibis	CAEG
Black-Crowned Night Heron	Nycticorax nycticorax	BCNH
American Bittern	Botaurus lentiginosus	AMBI
Waterfowl	Anseriformes	
Mute Swan	Cygnus olor	MUSW
Whistling Swan	Olor columbianus	WHSW
Trumpeter Swan	Olor buccinator	TRUS
Canada Goose	Branta canadensis	CAGO
Brant	Branta bernicula	BRAN
Emperor Goose	Philacte canagica	EMGO
White-fronted Goose	Anser albifrons	WFGO
Snow Goose	Chen caerulescens	SNGO
Ross' Goose	Chen rossii	ROGO
Unidentified Dabbling Duck		UNDA
Unidentified Diving Duck		UNDD
Mallard	Anas platyrhynchos	MALL
Black Duck	Anas rubripes	BLDU
Gadwall	Anas strepera	GADW
Pintail	Anas acuta	PINT
Green-Winged Teal	Anas crecca	GWTL
Blue-Winged Teal	Anas discors	BWTE
Cinnamon Teal	Anas cyanoptera	CITE
European Wigeon	Anas penelope	EUWI

American Wigeon	anas americana	AMWI
Northern Shoveler	Anas clypeata	NOSL
Wood Duck	Aix sponsa	WODU
Redhead	Aythya americana	REDH
Ring-Necked Duck	Aythya collaris	RNDU
Canvasback	Aythya valisineria	CANV
Greater Scaup	Aythya marila	GRSC
Lesser Scaup	Aythya affinis	LESC
Tufted Duck	Aythya fuligula	TUDU
Common Goldeneye	Bucephala clangula	COGO
Barrow's Goldeneye	Bucephala islandica	BAGO
Bufflehead	Bucephala albeola	BUFF
Oldsquaw	Clangula hyemalis	OLDS
Harlequin Duck	Histrionicus histrionicus	HADU
White-Winged Scoter	Melanitta deglandi	WWSC
Surf Scoter	Melanitta perspicullata	SUSC
Black Scoter	Melanitta nigra	BLSC
Ruddy Duck	Oxyura jamaicensis	RUDU
Hooded Merganser	Lophodytes cucullatus	HOMG
Common Merganser	Mergus merganser	COMG
Red-Breasted Merganser	Mergus serrator	RBMG
Vultures, Hawks and Falcons	Falconiformes	
Turkey Vulture	Cathartes aura	TUVU
Goshawk	Accipiter gentilis	GOSH
Sharp-Shinned Hawk	Accipiter striatus	SSHA
Cooper's Hawk	Accipiter cooperi	COHA
Red-Tailed Hawk	Buteo jamaicensis	RTHA
Red-Shouldered Hawk	Buteo linneatus	RSHA
Broad-Winged Hawk	Buteo platypterus	BWHA
Swainson's Hawk	Buteo swainsoni	SWHA
Rough-Legged Hawk	Buteo lagopus	RLHA
Marsh Hawk	Circus cyaneus	MAHA
Golden Eagle	Aquila chrysaetos	GOEA
Bald Eagle	Haliaeetus leacocephalus	BAEA
Osprey	Pandion haliaetus	OSPR
Gyrfalcon	Falco rusticolus	GYRF
Prairie Falcon	Falco mexicanus	PRFA
Peregrine Falcon	Falco peregrinus	PEFA
Merlin	Falco columbarius	MERL
American Kestrel	Falco sparverius	AMKE
Upland Game Birds	Galliformes	
Blue Grouse	Dendragapus obscurus	BLGR
Spruce Grouse	Canachites canadensis	SPGR
Ruffed Grouse	Banasa umbellus	RUGR
Willow Ptarmigan	Lagopus lagopus	WIPT

Rock Ptarmigan	Lagopus mutus	ROPT
White-Tailed Ptarmigan	Lagopus leucurus	WTPT
Sharp-Tailed Grouse	Pedioecetes phasianellus	STGR
Bobwhite	Colinus virginianus	BOBW
California Quail	Lophortyx californicus	CAQU
Mountain Quail	Oreortyx pictus	MOQU
Ring-Necked Pheasant	Phasianus colchicus	RNPH
Chukar	Alectoris chukar	CHUK
Gray Partridge	Perdix perdix	GRPA
Wild Turkey	Meleagris gallopavo	TURK
Cranes, Rails and Allies	Gruiformes	
Sandhill Crane	Grus canadensis	SACR
Virginia Rail	Rallus limicola	VIRA
Sora	Porzana carolina	SORA
Common Gallinule	Gallinual chloropus	COGA
American Coot	Fulica americana	AMCO
Shorebirds, Gulls, Auks and Allies	(Charadriiformes)	
Black Oystercatcher	Haematopus bachmani	BLOY
American Avocet	Recurvirostra americana	AMAV
Semipalmated Plover	Charadrius semipalmatus	SPPL
Killdeer	Charadrius vociferus	KILL
Black-Bellied Plover	Pluvialis squatarola	BBPL
Hudsonian Godwit	Limosa haemastica	HUGO
Marbled Godwit	Limosa fedoa	MAGO
Whimbrel	Numenius phaeopus	WHIM
Long-Billed Curlew	Numenius americanus	LBCU
Upland Sandpiper	Batramis longicauda	UPSA
Greater Yellowlegs	Tringa melanoleuca	GRYE
Lesser Yellowlegs	Tringa flavipes	LEYE
Solitary Sandpiper	Tringa solitaria	SOSA
Willet	Catoptrophorus semipalmatus	WILL
Spotted Sandpiper	Actitis macularia	SPSA
Wandering Tattler	Heteroscelus incanus	WATA
Ruddy Turnstone	Arenaria interpres	RUTU
Black Turnstone	Areanaria melanocephala	BLTU
Wilson's Phalarope	Steganopus tricolor	WIPH
Northern Phalarope	Lobipes lobatus	NOPH
Red Phalarope	Phalaropus fulicarius	REPH
Common Snipe	Capella gallinago	COSN
Short-Billed Dowitcher	Limnodromus griseus	SBDO
Long-Billed Dowitcher	Limnodromus scolopaceus	LBDO
Surfbird	Aphriza virgata	SURF
Red Knot	Calidris canutus	REKN
Sanderling	Calidris alba	SAND
Semipalmated Sandpiper	Calidris pusilla	SESA
Western Sandpiper	Calidris mauri	WESA
Least Sandpiper	Calidris minutilla	LESA
Baird's Sandpiper	Calidris bairdii	BASA

Pectoral Sandpiper	Calidris melanotos	PESA
Sharp-Tailed Sandpiper	Calidris acuminata	SHSA
Rock Sandpiper	Calidris ptilocnemis	ROSA
Dunlin	Calidris alpina	DUNL
Stilt Sandpiper	Micropalama himantopus	STSA
Buff-Breasted Sandpiper	Tryngites subruficollis	BBSA
Shorebird		SHOR
Pomarine Jaeger	Stercorarius pomarinus	POJA
Long-Tailed Jaeger	Stercorarius longicaudus	LTJA
Skua	Catharacta Skua	SKUA
Glaucous Gull	Larus hyperboreus	GLGU
Glaucous-Winged gull	Larus glaucescens	GWGU
Slaty-Backed Gull	Larus schistisagus	SBGU
Western Gull	Larus occidentalis	WEGU
Herring Gull	Larus argentatus	HERG
Thayer's Gull	Larus thayeri	THGU
California Gull	Larus californicus	CAGU
Ring-Billed Gull	Larus delawarensis	RBGU
Mew gull	Larus canus	MEGU
Franklin's Gull	Larus pipixcan	FRGU
Bonaparte's Gull	Larus philadelphia	BOGU
Little Gull	Larus minutus	LIGU
Heermann's Gull	Larus heermanni	HEEG
Black-Legged Kittiwake	Rissa tridactyla	BLKI
Sabine's Gull	Xema sabini	SAGU
Gull		GULL
Common Tern	Sterna hirundo	COTE
Arctic Tern	Sterna paradisaea	ARTE
Caspian Tern	Sterna caspia	CATE
Black Tern	Chlidonias niger	BLTE
Common Murre	Uria aalge	COMU
Thick-Billed Murre	Uria lomvia	TBMU
Pigeon Guillemot	Cepphus columba	PIGU
Marbled Murrelet	Brachyramphus marmoratus	MAMU
Ancient Murrelet	Synthliboramphus antiquus	ANMU
Cassin's Auklet	Ptychoramphus aleuticus	CAAU
Rhinoceros Auklet	Cerorhinca monocerata	RHAU
Horned Puffin	Fratercula corniculata	HOPU
Tufted Puffin	Lunda cirrhata	TUPU
Large Alcid		LGAL
Small Alcid		SMAL
Pigeons and Doves	Columbiformes	
Band-Tailed Pigeon	Columba fasciata	BTPI
Rock Dove	Columba livia	RODO
Mourning Dove	Zenaida macroura	MODO
Cuckoos	Cuculiformes	
Yellow-Billed Cuckoo	Coccyzus americanus	YBCU

Owls	Strigiformes	
Barn Owl	Tyto alba	BNOW
Screech Owl	Otus asio	SCOW
Flammulated Owl	Otus flammeolus	FLOW
Great Horned Owl	Bubo virginianus	GHOW
Snowy Owl	Nytea scandiaca	SNOW
Hawk Owl	Surnia ulula	HAOW
Pygmy Owl	Glaucidium gnoma	PYOW
Burrowing Owl	Athene cunicularia	BUOW
Barred Owl	Strix varia	BDOW
Spotted Owl	Strix occidentalis	SPOW
Great Gray Owl	Strix nebulosa	GGOW
Long-Eared Owl	Asio otus	LEOW
Short-Eared Owl	Asio flammeus	SEOW
Boreal Owl	Aegolius funereus	BOOW
Saw-Whet Owl	Aegolius adacicus	SWOW
Goatsucker	Caprimulgiformes	
Poorwill	Phalaenoptilus nuttallii	WHIP
Common Nighthawk	Chordeiles minor	CONI
Swifts and Hummingbirds	Apodiformes	
Black Swift	Cypseloides niger	BLSW
Vaux's Swift	Chaetura vauxi	VASW
White-Throated Swift	Aeronautes saxatalis	WTSW
Black-Chinned Hummingbird	Archilochus alexandri	BCHB
Anna's Hummingbird	Calypts anna	ANHB
Ruby-Throated Hummingbird	Archilochus colubris	RTHB
Calliope Hummingbird	Stellula calliope	CAHB
Rufous Hummingbird	Selasphorus rufus	RUHB
Kingfishers	Coraciiformes	
Belted Kingfisher	Megaceryle alcyon	BEKI
Woodpeckers	Piciformes	
Common Flicker	Colaptes auratus	COFL
Pileated woodpecker	Dryocopus pileatus	PIWO
Red-Headed Woodpecker	Melanerpes erythrocephalus	RHWO
Lewis' Woodpecker	Melanerpes lewis	LEWO
Yellow-Bellied Sapsucker	Sphyrapicus varius	YBSA
Williamson's Sapsucker	Sphyrapicus thyroideus	WISA
Hairy Woodpecker	Picoides villosus	HAWO
Downy Woodpecker	Picoides pubescens	DOWO
White-Headed Woodpecker	Picoides albolaruatus	WHWO
Black-Backed Three-Toed Wood	Picoides arcticus	BBTW
Northern Tree-Toed Woodpecker	Picoides tridactylus	NTTW

Northern Mockingbird	Mimus polyglottos	NOMO
Gray Catbird	Dumetella carolinensis	GRCA
Sage Thrasher	Oreoscoptes montanus	SATH
American Robin	Turdus migratorius	AMRO
Varied Thrush	Ixoreus naevius	VATH
Hermit Thrush	Catharus guttatus	HETH
Swainson's Thrush	Catharus ustulatus	SWTH
Gray-Cheeked Thrush	Catharus minimus	GCTH
Veery	Catharus fuscescens	VEER
Western Bluebird	Sialia mexicana	WEBL
Mountain Bluebird	Sialia currocoides	MOBL
Townsend's Solitaire	Myadestes townsendi	TOSO
Golden-Crowned Kinglet	Regulus satrapa	GCKI
Ruby-Crowned Kinglet	Regulus calendula	RCKI
Water Pipit	Anthus spinoletta	WAPI
Bohemian Waxwing	Bomycilla garrulus	BOWA
Cedar Waxwing	Bomycilla cedrorum	CEWA
Northern Shrike	Lanius excubitor	NOSH
Loggerhead Shrike	Lanius ludovicianus	LOSH
Starling	Sturnus vulgaris	STAR
Crested Myna	Acridotheres cristatellus	CRMY
Hutton's Vireo	Vireo huttoni	HUVI
Solitary Vireo	Vireo solitarius	SOVI
Red-Eyed Vireo	Vireo olivaceus	REVI
Philadelphia Vireo	Vireo philadelphicus	PHVI
Warbling Vireo	Vireo gilvus	WAVI
Black-And-White Warbler	Mniotilta varia	BAWW
Tennessee Warbler	Vermivora peregrina	TEWA
Orange-Crowned Warbler	Vermivora celata	OCWA
Nashville Warbler	Vermivora ruficapilla	NAWA
Yellow warbler	Dendroica petechia	YEWA
Magnolia Warbler	Dendroica magnolia	MAGW
Cape May Warbler	Dendroica tigrina	CMWA
Yellow-Rumped Warbler	Dendroica coronata	YRWA
Black-Throated Gray Warbler	Dendroica nigrescens	BTYW
Townsend's Warbler	Dendroica townsendi	TOWA
Chestnut-Sided Warbler	Dendroica pensylavanica	CSWA
Bay-Breasted Warbler	Dendroica castanea	BBWA
Blackpoll Warbler	Dendroica striata	BKPW
Palm Warbler	Dendroica palmarum	PAWA
Ovenbird	Seiurus aurocapillus	OVEN
Northern Waterthrush	Seiurus noveborancensis	NOWA
Connecticut Warbler	Oporornis agilis	COWA
Mourning Warbler	Oporornis philadelphia	MOWA
MacGillivray's Warbler	Oporonis tolmiei	MAWA
Common Yellowthroat	Geothlypis trichas	COYE
Yellow-Breasted Chat	Icteria virens	YBCH
Wilson's Warberl	Wilsonia pusilla	WIWA
Canada Warbler	Wilsonia canadensis	CAWA
American Redstart	Setophaga ruticilla	AMRE

Perching Birds	Passeriformes	
Eastern Kingbird	Tyrannus tyrannus	EAKI
Western Kingbird	Tyrannus verticolis	WEKI
Ash-Throated Flycatcher	Myiarchus cinerascens	ATFL
Eastern Phoebe	Sayornis phoebe	EAPH
Say's Phoebe	Sayornis saya	SAPH
Yellow-Bellied Flycather	Empidonax flaviventris	YBFL
Willow Flycatcher	Empidonax traillii	WIFL
Alder Flycatcher	Empidonax alnorum	ALFL
Least Flycatcher	Empidonax minimus	LEFL
Hammond/s Flycatcher	Empidonax hammondiid	HAFL
Dusky Flycatcher	Empidonax oberholseri	DUFL
Western Flycatcher	empidonax difficilis	WEFL
Western Wood Peewee	Contopus sordidulus	WWPE
Olive-Sided Flycatcher	Nuttallornis borealis	OSFL
Skylark	Alauda arvensis	SKYL
Horned Lark	Eremophila alpestris	HOLA
Violet-Green Swallow	Tachycineta thalassima	VGSW
Tree Swallow	Iridoprocne bicolar	TRSW
Bank Swallow	Riparia riparia	BKSW
Rough-Winged Swallow	Stelgidopteryx ruficollis	RWSW
Barn Swallow	hirundo rustica	BNSW
Cliff Swallow	Petrochelidon pyrrhonota	CLSW
Purple Martin	Progne subis	PUMA
Gray Jay	Perisoreus canadensis	GRJA
Blue Jay	Cyanocitta cristata	BLJA
Steller's Jay	Cyanocitta stelleri	STJA
Black-Billed Magpie	Pica pica	BBMA
Common Raven	Corvus corax	COMA
Common Crow	Corvus brachyrhynchos	COCR
Northwestern Crow	Corvus caurinus	NWCR
Clark's Nutcraker	Nucifraga columbiana	CLNU
Black-Capped Chickadee	Parus atricapillus	BCCH
Mountain Chickadee	Parus gambeli	MOCH
Boreal Chickadee	Parus hudsonicus	BOCH
Chestnut-Backed Chickadee	Parus rufescens	CBCH
Bushtit	Psaltriparus minimus	BUSH
White-Breasted Nuthatch	Sitta carolinensis	WBNU
Red-Breasted Nuthatch	Sitta canadensis	RBNU
Pygmy Nuthatch	Sitta pygmaea	PYNU
Brown Creeper	Certhia familiaris	BRCR
Dipper	Cinclus mexicanus	DIPP
House Wren	Troglodytes aedon	HOWR
Winter Wren	Troglodytes troglodytes	WIWR
Bewick's Wren	Thryomanes bewickii	BEWR
Long-Billed Marsh Wren	Cistothorus palustris	LBMW
Canyon Wren	Catherpes mexicanus	CAWR
Rock Wren	Salpinctes obsoletus	ROWR

House Sparrow	Passer domesticus	HOSP
Bobolink	Dolichonyx oryzivorus	BOBO
Western Meadowlark	Sturnella neglecta	WEME
Yellow-Headed Blackbird	Xanthocephalus xanthocephalus	YHBL
Red-Winged Blackbird	Agelaius phoeniceus	RWBL
Northern Oriole	Icterus galbula	NOOR
Rusty Blackbird	Euphagus carolinus	RUBL
Brewer's Blackbird	Euphagus cyanocephalus	BRBL
Common Grackle	Quiscalus quiscula	COGR
Brown-Headsed Cowbird	Molothrus ater	BHCO
Western Tanager	Piranga lucoviciana	WETA
Rose-Breasted Grosbeak	Pheucticus ludovicianus	RBGR
Black-Headed Grosbeak	Pheucticus melanocephalus	BHGR
Lazuli Bunting	Passerina amoena	LAZB
Evening Grosbeak	Hesperiphona vespertina	EVGR
Purple Finch	Carpodacus purpureus	PUFI
Cassin's Finch	Carpodacus cassinii	CAFI
House Finch	Carpodacus mexicanus	HOFI
Pine Grosbeak	Pinicola enucleator	PIGR
Gray-Crowned Rosy Finch	Leucosticte australis	GCRF
Hoary Redpoll	Carduelis hornemanni	HORE
Common Redpoll	Carduelis flammea	CORE
Pine Siskin	Carduelis pinus	PISI
American Goldfinch	Carduelis tristris	AMGO
Red Crossbill	Loxia curvirostra	RECR
White-Winged Crossbill	Loxia leucoptera	WWCR
Rufous-Sided Towhee	Pipilo erythrophthalmus	RSTO
Lark Bunting	Calamospiza melanocorys	LARB
Savannah Sparrow	Passerculus sandwichensis	SAVS
Grasshopper Sparrow	Ammodramus savannarum	GRSP
Leconte's Sparrow	Ammospiza leconteii	LESP
Sharp-Tailed Sparrow	Ammospiza caudacuta	STSP
Vesper Sparrow	Pooecetes gramineus	VESP
Lark Sparrow	Chondestes grammacus	LASP
Dark-Eyed Junco	Junco hyemalis	DEJU
Tree Sparrow	Spizella arborea	TRSP
Chipping sparrow	Spizella passerina	CHSP
Clay-Colored Sparrow	Spizella pallida	CCSP
Brewer's Sparrow	Spizella breweri	BRSP
Harris' Sparrow	Zonotrichia querula	HASP
White-Crowned Sparrow	Zonotrichia leucophrys	WCSP
Golden-Crowned Sparrow	Zonotrichia atricapilla	GCSP
White-Throated Sparrow	Zonotrichia albicollis	WTSP
Fox Sparrow	Passerella iliaca	FOSP
Lincoln's Sparrow	Melospiza lincolnii	LISP
Swamp Sparrow	Melospiza georgiana	SWSP
Song Sparrow	Melospiza melodia	SOSP
Lapland Longspur	Calcarius lapponicus	LALO
Smith's Longspur	Calcarius pictus	SMLO
Snow Bunting	Plectrophenax nivalis	SNBU